ENGINEERING HANDBOOK

TIMKEN

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TIMKEN
TAPERED ROLLER BEARINGS

Made in England

Registered Trade Mark : TIMKEN

ENGINEERING HANDBOOK

List Prices and Dimensions with information relating to load carrying capacity, method of selection and fitting tolerances.

HOME EDITION

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Manufacturers of FBC Ball and Roller Bearings and Transmission Equipment.

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IMPORTANT

Timken tapered roller bearings, with the exception of Timken flat thrust bearings (pages 76 and 77) and Timken airscrew bearings (page 79) are marked with two complementary numbers.

One of these numbers is stamped on the cone (or inner race) : the other is stamped on the cup (or outer race). Both these numbers should be quoted when ordering.

Only one number need be quoted when ordering Timken flat thrust and airscrew bearings which are marked with one identification number only.

If, as sometimes happens when bearings are required as replacements, the numbers on the bearings being replaced are not clearly legible, the name and model number of the vehicle or machine for which they are required, and the position for which they are required, should be given. With this information the bearing can invariably be identified. Alternatively, the dimensions represented by the letters A, B, C, E, etc., on the diagrams in this catalogue should be given.

The successful operation of Timken tapered roller bearings is dependent upon the correct design of the application. We strongly urge engineers before finalising their designs, to consult our Technical Department, whose wide experience and service is available free of charge, in order to ensure that the most up-to-date practice is followed.

We consider this recommendation of such importance that we feel it advisable to draw your attention to clause Nine of our Conditions of Sale.

CONDITIONS OF SALE

Validity.

1. Unless previously withdrawn this tender expires within sixty days from date hereof. An order, whether on the tender or otherwise, shall be an offer and shall not be binding on the Company until it has been accepted in writing from the Head Office at Cheston Road, Aston, Birmingham. As conditions, whether of prices or labour or otherwise, may be changed after the issue of this tender the prices of deliveries quoted are subject to confirmation on receipt of an offer. All previous communications not specifically mentioned in the order or the acceptance thereof are understood to be cancelled. In the event of delay, for which the Company are not responsible, taking place between the date of their acceptance of an offer and the receipt by them of sufficient information to enable them to proceed with the order forthwith the Company are to be at liberty to amend the tender prices to cover any increase in cost which has taken place after the date of acceptance.
This quotation is based upon the present current rate of wages and current prices of material, apparatus and transport charges.
Any increase in cost of materials, transport or apparatus will be added to the quoted price and for every one shilling per week increase in wages 1% shall be added to such proportion of the contract to which such increase has applied.
The Company's Auditor's certificate to be accepted as final.

Limit of Contract.

2. Quotations only refer to the goods or articles therein specified.

Drawings.

3. All descriptive and forwarding specifications, drawings and particulars of weights and dimensions submitted with this tender are approximate only and the descriptions and illustrations contained in catalogues, price lists and other advertisement matter are intended merely to present a general idea of the goods described therein, and none of these shall form part of the contract. Every reasonable precaution will be taken to ensure accuracy of the weights and dimensions shown on the despatch notes and shipping documents, but such figures must be taken as subject to a margin of ten per cent.

Terms of Payment.

4. Where no other terms of payment have been agreed, prices are strictly net and payment in full in respect of any of the goods shall be due upon presentation of invoices and/or shipping documents in England. Any liability on the Company's part is subject to the terms of payment and all the purchaser's other obligations under the contract being strictly observed.
NOTE. For new business satisfactory references are necessary. Financial arrangements when required must be made to the Company's satisfaction.

Delivery.

5. Unless otherwise specified delivery of all goods is made at the Company's Works. Any time or date given for delivery is given and intended as a business estimate and shall not involve any contractual obligation. The time given for despatch is to date from the Company's acceptance of an offer, and from receipt by them of all the necessary information and drawings to enable them to put the work in hand. They will use their best endeavours to despatch on the date given, but will accept no liability for failure to do so unless a guarantee shall have been given in writing under an agreed penalty (as liquidated damages) for late despatch, and the purchaser has suffered loss by the delay. Should despatch be hindered or delayed by the purchaser's instructions or lack of instructions or by any cause whatsoever beyond the Company's reasonable control, including strikes, lock-outs, war, fire, accidents or defective material, a reasonable extension of time shall be granted. In the event of the suspension of the work by the purchasers' instructions or lack of instructions the contract price shall be increased to cover any extra expense thereby incurred by the Company. Where the fulfilment of any order involves the making of separate deliveries each delivery shall be deemed to be a separate contract. The Company reserves the right to suspend any delivery while any account whatsoever is overdue.

Packing. 6. Cases are charged at cost prices, and are not returnable unless otherwise agreed.

Loss or Damage in Transit. 7. The Bearings are carefully inspected and packed before delivery. Goods when forwarded are at purchaser's risk and the Company shall not be under any obligation to give the purchaser further notice, statutory or otherwise, that they accept no responsibility. Any claims for loss or damage in transit should be made immediately to the carriers concerned.

Determination of Contract. 8. If the purchaser shall make default in or commit any breach of any of his obligations to the Company, or if any distress or execution shall be levied upon his property or assets, or if he shall make or offer to make any arrangements or composition with creditors, or commit any act of Bankruptcy, or if any Petition or Receiving Order in Bankruptcy shall be presented or made against him, or if the purchaser shall be a Limited Company and any Resolution or Petition to Wind-up such Company's business shall be passed or presented, or if a Receiver of such Company's undertaking, property or assets or any part thereof shall be appointed, the Company shall have the right forthwith to determine any contract then subsisting and upon written notice of such determination being posted by them to the purchaser's last known address any subsisting contract shall be deemed to have been determined without prejudice to any claim or right the Company might otherwise make or exercise.

Guarantee. 9. The following GUARANTEE is given in lieu of and so as to exclude any condition or warranty, express or implied by Statute or otherwise, and it is hereby agreed that the Company shall be under no further or other liability or obligation nor liable for any loss, injury or damage caused or alleged to have arisen by reason of any failure or defect whatsoever in respect of any goods supplied by the Company. When Bearing sizes and their mounting under specifications which have been submitted to the Company have been approved by the Company in writing the Company undertake to repair or replace free of charge ANY BEARINGS SO USED and found to be defective in workmanship or material within TWELVE MONTHS from the date of their delivery by the Company new from the Company's Works PROVIDED the Bearings when returned to the Company carriage paid by the purchaser (together with reasonable proof of identity) are found by the Company to be so defective. It must be clearly understood that the Company do not accept any responsibility whatever in any case in which the application has not been approved by them in writing.

Prevention. 10. If any cause beyond the Company's control shall prevent the due fulfilment of any of their obligations during the continuance of such prevention such obligations shall be deemed to be suspended.

Patents. 11. The sale of Bearings by the Company implies the granting of a Licence by the Company to the purchaser to use or vend the said Bearings under any of the Company's patents, and also to manufacture and vend any Bearing, Mounting, Assembly or Arrangement forming the subject of any patent held by the Company, provided that such Bearing, Mounting, Assembly or Arrangement is fitted with the said Bearings purchased from the Company, and also provided that the same is marked with the number of the Company's patent under which it is made, but not otherwise.

Arbitration. 12. If at any time any question, dispute or difference whatever shall arise between the purchaser and the Company upon, in relation to, or in connection with the contract, either of them may give to the other notice in writing of the existence of such question, dispute, or difference, and the same shall be referred to the arbitration in England of a person to be mutually agreed upon, or failing agreement, of some person appointed by the President for the time being of the Institution of Mechanical Engineers. This submission shall be deemed to be a submission to arbitration within the meaning of the Arbitration Act, 1889, or any statutory modification thereof.

Legal Construction. 13. All Contracts are subject to these standard conditions and shall be construed in accordance with English Law.

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THE PRODUCTS OF BRITISH TIMKEN LIMITED

Tapered Roller Bearings

It is upon the invention and perfection of tapered roller bearings that the name Timken has attained its present enviable reputation. Although nearly fifty years have passed since the first Timken Tapered Roller Bearing was produced, the principle remains constant.

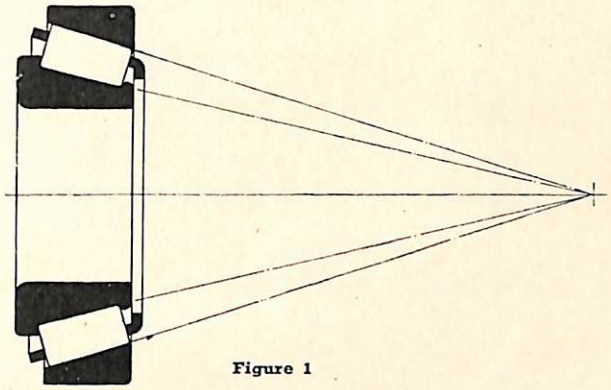


Figure 1

A Timken Tapered Roller Bearing in its simplest form consists of four elements, namely, outer race, inner race (known respectively as cup and cone), rollers and cage. These are shewn in Fig. 2, and all are of conical construction, such that lines drawn coincident with the working surfaces of the rollers and races will, when produced, meet in a common point on the axis of the bearing (Fig. 1). This construction ensures true rolling motion and at the same time gives a bearing that will handle all loads, radial or thrust, or both, in any combination.

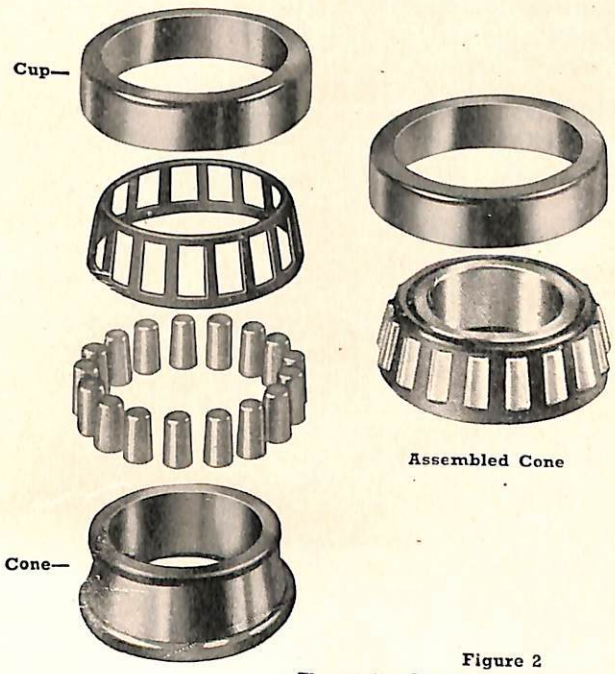


Figure 2
The parts of a Timken Tapered Roller Bearing.

The versatility of the design on the basic taper principle, which is retained in all forms of the bearing, is such that any ratio of radial to thrust load capacity may be obtained, by varying the position on the axis of the point at which the apices of the conical working surfaces coincide. Where this point is at infinity, pure radial load capacity only is obtained, as in the case of a cylindrical roller bearing. At the opposite extreme where the point is at zero, that is the centre of the

bearing, pure thrust load capacity only exists. (Fig. 3.) The taper construction, therefore, enables bearings to be designed to carry all loads, regardless of whether they are all radial, all thrust, or combinations of these.

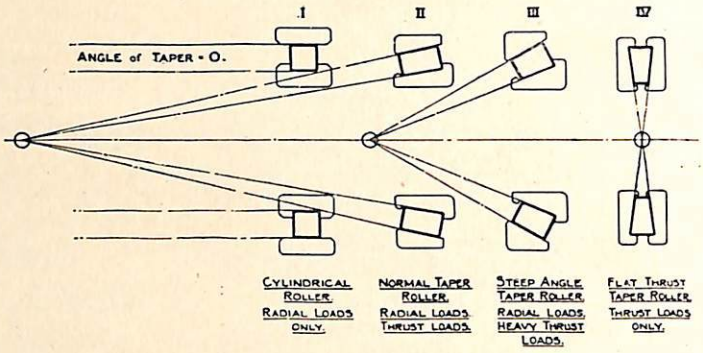


Figure 3

Standard Timken Tapered Roller Bearings are made from case-hardening alloy steel, affording great capacity for withstanding repeated shock loads.

For certain applications it is desirable to use a variation of the single row bearing described above. In the following paragraphs we give a description of all the types of Timken Tapered Roller Bearings now in general use.

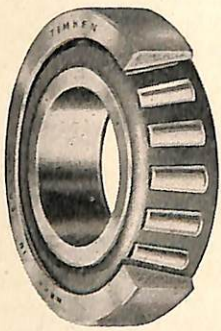


Figure 4

(a) **Type S. Single Row Tapered Roller Bearing.** This is made in numerous "Series", each having its own load carrying characteristics, which are obtained by varying the size and number of rollers in the bearing. In each series this load carrying characteristic remains constant, but the outside diameter of the cup, the bore diameter of the cone, and the overall length of each bearing may vary, within fairly wide limits. It is in this way that the immense range of Timken Tapered Roller Bearings has been built up and is maintained. This type of bearing is designed to carry a greater proportion of radial than thrust load.

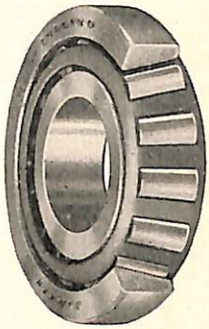


Figure 5

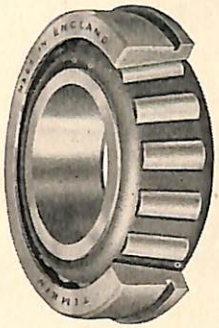


Figure 6

(b) **Type SS. Single Row Tapered Roller Bearing.** This is usually referred to as the "steep angle" type, and is made in a variety of series. The internal angles are so arranged that the thrust capacity is always greater than the radial capacity of the bearing.

(c) **Type SF. Single Row Flanged Cup Tapered Roller Bearing.** This single row bearing with the flanged cup is available in a wide range of series of high radial and high thrust load carrying capacity. By locating on the flange, shoulders in the housing bore can be eliminated, giving easier and more accurate machining. This type is widely used in Machine Tool construction.

Figure 7

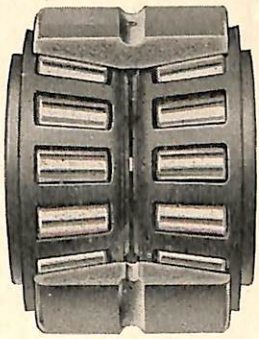


Figure 8

(d) **Type DO. Two Row Tapered Roller Bearing** with double cup and single cones. These bearings are supplied either with or without cone spacer. In the first case, a spacer of the required width to give the correct running clearance is introduced into the bearing at the time of assembly, but in the second, a conventional means of adjustment is used (Figs. 7 and 8). The radial capacity of these bearings is twice that of a single bearing of the same series, and the bearing has a thrust capacity in **both** directions, equal to that of a single bearing in one direction. The groove and holes machined in the cup allow lubricant to be fed to the centre of the bearing.

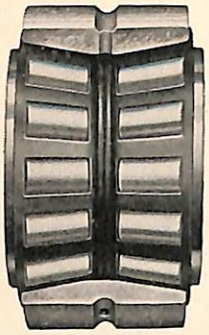


Figure 9

(e) **Type NA. Two Row Tapered Roller Bearing** with double cup and special single cones. Non-adjustable. The cones of these bearings are so arranged that when the bearing is adjusted during manufacture to give the correct running clearance, the two inner faces abut upon each other. No subsequent adjustment is either necessary or possible. These bearings are much used in those assemblies where it is not desirable to provide means of adjustment in service. The groove and holes in the cup are for lubrication purposes.

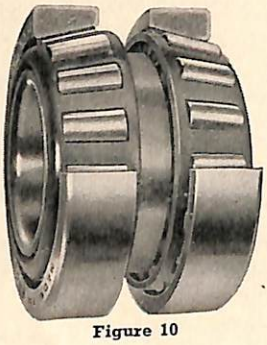


Figure 10

(f) **Type DI. Two Row Tapered Roller Bearing** with double cone and single cups. This bearing is supplied with or without adjusting spacer placed between the cups. It is used extensively in Railway axleboxes.

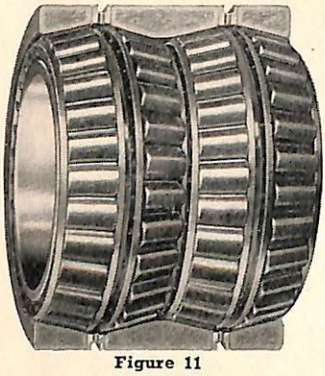


Figure 11

(g) **Type QO. Four Row Tapered Roller Bearing** with two double cones, one double cup and two single cups, complete with cup and cone spacers. Small sizes of this type have pressed steel cages, but larger sizes have built-up ones of electrically welded construction. Four row bearings will carry four times the radial load that a single bearing of the same series will carry. The cup spacers are grooved and drilled to permit lubricant to be fed to the bearing. This type is used largely on the roll necks of Rolling Mills, and is made in the largest sizes up to nearly four tons in weight.

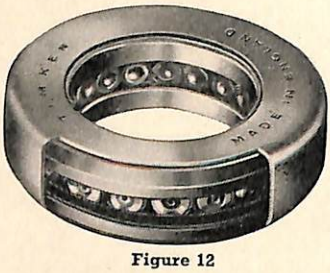


Figure 12

(h) **Type T. Flat Single Row Tapered Roller Bearings**. These bearings are designed to carry thrust load only. They are made in a great variety of sizes, with and without cages, while some have special pressed steel containers, fully loaded with grease. Specially toughened rubber backing rings are also available for special applications.

Tapered Roller Bearings *(Continued)*

(j) **Special Bearings.** From the great variety of types and sizes of standard bearings described above, it is possible to make a suitable selection for almost any application. There do exist, however, certain other bearings, modifications of existing types, that have been specially developed for applications. These include :—

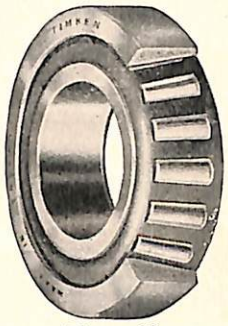


Figure 13.

(i) **Precision Bearings.** The requirements of machine tool design can often be met only by the use of a precision bearing manufactured to the highest and most uniform degree of concentricity. Such bearings are now available in two grades :—

(a) *Precision No. 3*—in which the total eccentricity measured with one race revolving and the other stationary does not exceed ·0003″;

(b) *Precision No. 5*—in which, under the same conditions, the total eccentricity is a maximum of ·0005″.

These tolerances apply to bearings up to and including 8″ outside diameter. For bearings in excess of this diameter reference should be made to Technical Department.

The eccentricity figures refer to unmounted and unloaded bearings, and it is often found that when these are mounted on an accurately machined spindle, the run-out of the spindle is less than that of the individual bearings.

(ii) **V.P. Airscrew Bearings.** A special design incorporating the two-row principle has been developed for supporting the blades of V.P. Airscrews. This bearing provides—

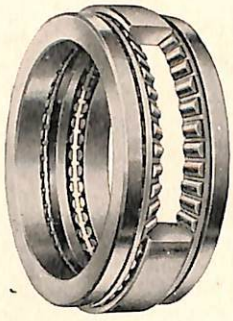


Figure 14

(1) The greatest possible thrust capacity to carry the high centrifugal load acting along the axis of the bearing.

(2) Sufficient radial capacity to centre the blade positively about its own axis of rotation.

(3) The maximum resistance to the tilting loads set up by air pressure, blade inertia and gyroscopic effects on the blades.

(4) A low frictional resistance from rest, necessary to give a sensitive blade pitch adjustment through the engine governor, and smooth functioning of the variable pitch gear.

This bearing is made in accordance with the Company's British Patent No. 541459.

(iii) **For Aeroplane Wheels** a range of special light section bearings has been designed but the full range is not yet in production. Details of these bearings may be had on application.

Figure 15

(iv) Single Row Tapered Roller Assembly for motor vehicle steering gears. The cone is usually formed on the worm at the end of the steering column. The rollers are held in position by means of a specially designed cage.

FBC Ball and Cylindrical Roller Bearings

A full range of these types is manufactured by our associated company, Fischer Bearings Co. Ltd., Wolverhampton.

The Timken Wear and Lubricant Tester

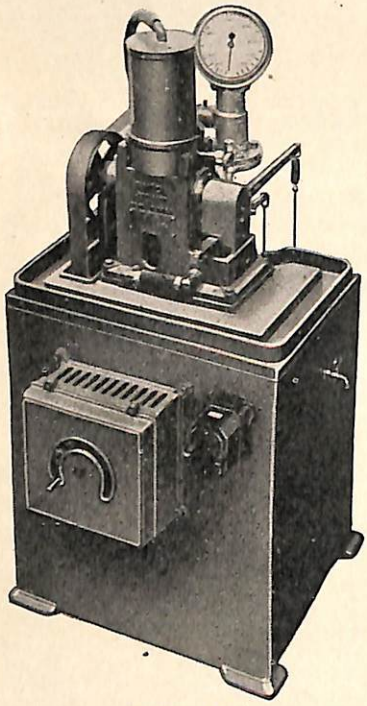


Figure 16

General view of the machine

Developed originally for the testing of the many hundreds of different lubricants annually submitted for approval for the lubrication of Timken Tapered Roller Bearings, the Timken Wear and Lubricant Testing Machine has proved to be of much wider application. It is to-day in regular use in the following ways :—

(a) Routine testing of lubricant film strength by lubricant makers and blenders.

(b) Development testing of new lubricants by their makers, to determine their characteristics with regard to friction and wear on standard materials.

(c) Development of new bearing materials by motor car and aircraft manufacturers, in Government research laboratories and universities. For further details please request our publication No. 332.

CONDITIONS AFFECTING THE CHOICE OF MOUNTING

The precise method of mounting to be adopted depends greatly on individual circumstances.

Many standardised mountings have been established for such applications as wheel hubs and rear axle drives of automotive vehicles, railway axleboxes, machine tool spindles, reduction gear drives, rolling mills and mine cars, and these are described in appropriate publications.

A few of the chief operating conditions which affect the mounting are given below together with the preferred bearing conditions.

(1) **Revolving Shaft.** The cones should be made a press fit to prevent movement on the shaft, and the adjustment of the bearings effected through the stationary cups (Fig. 19).

(2) **Stationary Shaft.** A light creep fit should be adopted for the cones to allow slight slip and thus prevent load concentration on one portion of the cone race. The adjustment of the bearings should be made through the stationary cones. To afford active support to the cups and prevent creep, these members should be made a press fit in the housing. (Fig. 17.)

(3) **Narrow Bearing Spread** requires the indirect mounting for stability, i.e., resistance to tilting.

(4) **Wide Bearing Spread.** Either the direct or the indirect mounting can be adopted, provided that only negligible expansion and contraction are present. A double bearing location at one end, with a floating bearing at the other, should be adopted when expansion or contraction must be taken into account (Fig. 20).

(5) **High Speed.** All races should be press-fitted to avoid any looseness causing vibration. The adjustment device must be powerful enough to operate through the press-fitted member, except where a stationary cup is carried in an extension of a housing cover, as in Fig. 23.

(6) **Heavy Loads** (including shock loads) require that the large ends of the rollers be placed nearest to the load line. All races should be press-fitted to avoid looseness, which may set up destructive hammering. The adjustment device referred to under High Speed is applicable also to this case.

(7) **Thrust Loads.** Where thrust load predominates it is preferable to adopt the SS type bearing. The position for the bearing should be chosen with care, and it is preferable to place it at the non-driving end of the shaft, which latter, not being subject to torque, often can be reduced in diameter, allowing a smaller size bearing to be used. This position for the bearings, in the case of a wormshaft, avoids superimposing on the torque the tension or compression due to the thrust, and this reduces the total resultant stress in the shaft.

In applications where shaft deflection must be reduced to a minimum, the thrust bearings should be placed so that the shaft is in tension due to the thrust and not in compression, which latter condition would increase any shaft deflection present.

All races should be given a press fit so that the housing and shaft actively support the bearing races against the expansion and contraction forces on the cup and cone respectively.

Where possible the cups should be pressed into extensions of the covers as this gives additional support to resist the expansion effect of the thrust load on the cup.

The adjustment device should conform to the requirements outlined under No. 5.

Conditions affecting the Choice of Mounting *(Continued)*

(8) **Overhung Radial Loads.** These entail increased bearing capacity and should be avoided. Where this is not possible the bearing should be placed as close as possible to the load line to reduce overhang, and the large ends of the rollers nearest to the load for maximum resistance against deflection.

These requirements represent the ideal conditions to be aimed at, but, in practice, manufacturing and assembling requirements or some special condition may compel the adoption of a compromise.

The above conditions can occur in combination, such, for example, as (1) and (3) where the press-fit condition for the revolving shaft conflicts with the indirect mounting required for a narrow bearing spread. The circumstances of the application require careful consideration to determine which is the more important condition to be met, and the mounting arranged accordingly. Should the indirect mounting be deemed indispensable, then the press fit of the adjusting cone might be reduced sufficiently to allow for adjustment, yet prevent slipping on the shaft. A cone spacer finished to length to suit the bearing adjustment occasionally can be placed between the cones, and the whole shaft assembly clamped solidly against the shoulder by a single nut, suitably locked.

Such problems often occur in designing bearing applications, but usually they can be solved after weighing up carefully the opposing conditions as in the above example.

Some Typical Mountings

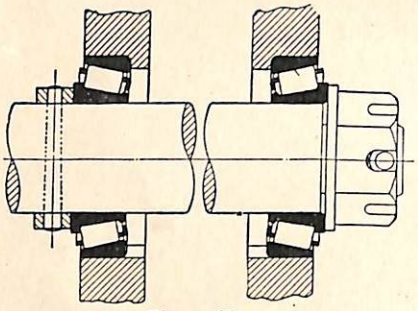


Figure 17

Figure 17

Two identical single bearings, cone adjusted, one bearing fixed against a collar pinned to the shaft. Adjust through second bearing cone by nut and washer, locked by a split pin. Cup housing provided with slots to facilitate removal of cups. Where the shaft is revolving and the cone is, in consequence, a press fit, the inner bearing may be of larger bore than the outer to avoid pressing it a considerable distance along the shaft during assembly or dismantling. The cone may also abut a shoulder on the shaft, as in Fig. 19 (The alternative adjustment by shims, as in Fig. 22, may be used.

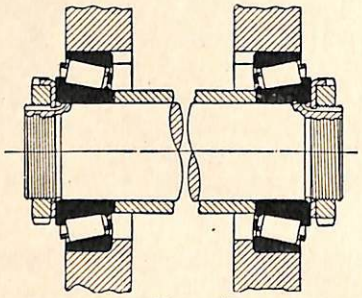


Figure 18

Figure 18

Two single row bearings, cone adjusted. With conventional cup housings as in Fig.17, the cones are held correctly adjusted by a spacer and shims placed between them. The cones are then held hard to the spacer by nuts, locked in position by tongued washers.

Some Typical Mountings *(Continued)*

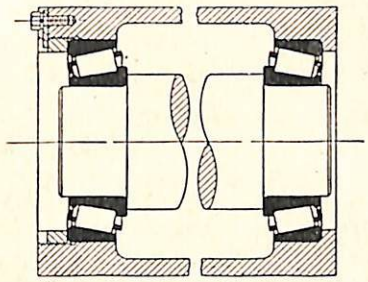


Figure 19

Figure 19

Two single row bearings, cup adjusted. Both cones are conventionally mounted against shoulders on the shaft. One cup is mounted conventionally against a shoulder in the housing, and the other cup is located by a screwed cup follower, which also gives the adjustment, and is then locked in place by a suitable device.

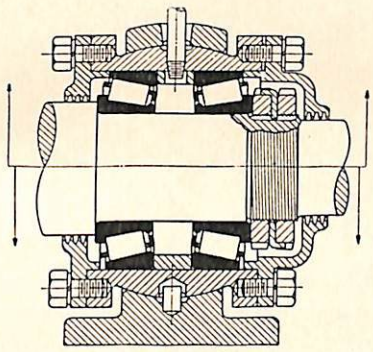


Figure 20

Figure 20

Two single row bearings, indirectly mounted, cone adjusted, self-aligning, alternatively fixed or floating. One cone is located against a shoulder on the shaft, the other is located against, and adjusted by, a pair of nuts locked by a tongued washer. The cups are carried in a straight-through bored spherical housing and are held apart by a spacer. The upper half of the drawing shows how the cups may be held and fixed against the spigots on the end covers, which are held by set bolts. The lower half of the drawing shows the spigots arranged for the clearance necessary for allowing the bearings to float in the housing. A pin driven into the main housing prevents rotation of the spherical housing in its seat. The fixed mounting is employed at one end of the shaft and the floating mounting at the other, thus making provision for expansion and contraction effects. Lubricant is fed between the bearings.

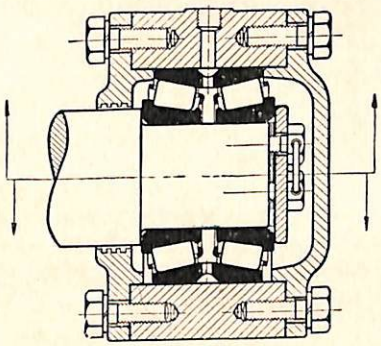


Figure 21

Figure 21

Two row bearing. Type DO, cone adjusted. The upper and lower halves show the "fixed" and "floating" mountings of the cup respectively. The cones are adjusted by shims between the shaft end and the end plate. The latter is fixed by set bolts.

As an alternative adjustment, a spacer, ground to correct width, may be fitted between the cones. The inner races would then be clamped up to shoulder by a nut suitably locked.

TIMKEN "T" TYPE BEARINGS

The following four applications are of the Timken "T" type bearing, and the undernoted general principles must be followed for a successful mounting.

(1) The Timken "T" type bearing carries **Thrust** loads only, and it is necessary to provide radial support to the shaft.

(2) The races and rollers must be held in contact at all times, whether loaded or not. Many bearings are provided with an outer container for this purpose, but in the larger sizes, special provision must be made to obtain this condition. Horizontal shaft mountings require great care in this respect.

In crane hook applications, where the load always acts vertically downwards, and there is never any upward load, the weight of the hook, etc., is sufficient to ensure this condition. It is usual, however, to limit the possible vertical lift to a small amount.

(3) The faces supporting the races must be truly flat and square with the axis of revolution, and robust enough to maintain this condition under load. Spherical seats may be necessary in a few cases where severe mis-alignment takes place, alternatively, a hard rubber ring may be used to counteract this condition.

(4) The revolving race, the outer rib of which carries the outward thrust of the rollers, must be mounted truly concentric with the axis of revolution, while the stationary race must be given a slight radial float to allow of self-centring with the revolving race. It will be seen that if the revolving race runs eccentrically, the fixed race, while under load, endeavours to follow the eccentricity, thus imposing severe additional loads on the rollers.

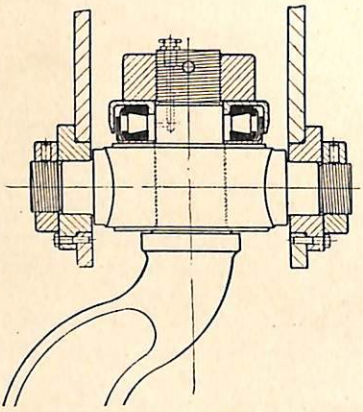


Figure 22

Figure 22

"T" type bearing with axis vertical. Rotation intermittent. Light crane hook mounting.

The revolving upper race is mounted an interference fit on the the spigot of a ring which closely fits the shank. The bearing sits loosely in a flanged steel container, and the upper ring closely surrounds the whole assembly to retain grease and exclude water. The stationary lower race is a free fit both in the bore and on outside diameter. For small size bearings, the rotating race can be fitted slightly loose if desired.

SHAFT AND HOUSING DESIGN

Having examined generally on pages 13-16 the many different ways in which Timken Tapered Roller Bearings may be applied, it is desirable now to point out a few specific points which should be borne in mind when designing the housings.

It is of prime importance to remember that provision should be made for the removal of the bearing as well as fitting it. The shoulder, therefore, either in the housing or upon the shaft, against which the cup or cone locates, should be large enough to provide an adequate backing for the component, and yet allow some portion of it to protrude so that pressure may be applied for removal. If this is not possible, then removal slots may be provided, or the component may be located against a suitable spacer. Such spacers should be a press fit upon the shaft if the shoulder is of low height.

The fillet radius of all shoulder locations must be at least $\frac{1}{64}$th" less than the radius of the cup or cone (Fig. 23) to ensure contact is made only on the square face of the shoulder.

Where a very small fillet radius is adopted the effect of the concentration of stresses at this point should be noted. The insertion of a press-fitted spacer as shewn below the centre line in Fig. 23, permits less height of shaft shoulder or a more generous fillet radius, and thus avoids the sudden change of stress in the shaft.

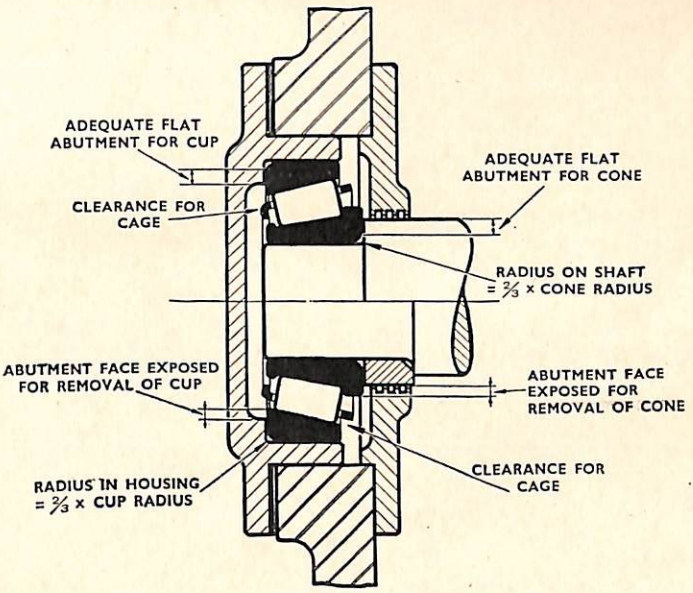


Figure 23

Sufficient space must be left around the bearing to provide :—

(a) a reservoir for lubricant, and

(b) clearance for the cage, which must not be allowed to rub against adjacent stationary parts.

LUBRICATION

Timken Tapered Roller Bearings may be lubricated either by oil or grease. The choice is governed by :—

(1) Bearing size.
(2) Speed.
(3) Operating Temperature.
(4) Load.
(5) Working Conditions.

In each case the most adverse condition should be the governing one.

Grease lubrication may be adopted where :—

(1) The outside diameter of the bearing does not exceed 6 in., the speed does not exceed 1,000 r.p.m., and the temperature does not exceed 200°F.
(2) The outside diameter of the bearing is between 6 in. and 12 in., the speed does not exceed 500 r.p.m., and the temperature does not exceed 200°F.

For bearings above 12 ins., outside diameter, specific recommendations should be obtained from British Timken Limited.

The housing design should permit the storage of a reserve supply to ensure continued lubrication of the bearings between intervals of grease replenishment. The space should not be too large, however, or there will be a risk of centrifugal action throwing the grease away from the bearings. Methods for replenishment either by pressure gun or other positive means should be incorporated. As continued revolution often builds up a pressure inside the housing it is sufficient as a general rule to pack the latter about two-thirds full.

Oil lubrication is essential where :—

(1) Speed is high.
(2) Very high or very low temperatures are encountered.

Speed is usually the main factor in determining the adoption of oil as the lubricating medium, and as operating temperatures are influenced greatly by the relation between the speed and the volume of lubricant in the housing, it is desirable to examine from this aspect the precise method by which the oil is to be applied to the bearings.

The following are the several methods employed, and in all cases the general principle is the supply of the oil to the small ends of the rollers, as the centrifugal effect of the tapered construction of the bearing will circulate the lubricant.

Oil Level System.

In slow or medium speed applications it is usually adequate to maintain an oil level sufficient to immerse the lower end of the bottom roller. This may be effected by fitting a vertical elbow pipe, the top of which, closed by a plug, is at the maximum oil level. To replenish oil is poured in until it overflows. The level indicator may consist of a circular window, or a vertical glass tube, on which the level desired is clearly marked. The position of the indicator should be arranged so that the level reading may be unaffected by the swirling of the oil.

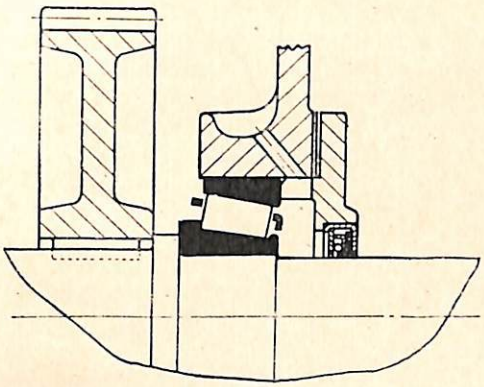


Figure 24

Splash.

In the case of medium speed gear drives and similar applications, splash lubrication has proved effective. Pockets or troughs are provided over the bearing housings and arranged to catch the oil thrown off by the gears or draining down the walls of the casing. Holes should be drilled to lead the oil from the pockets to the small ends of the rollers (Fig. 24). This system should be used only where it is certain that the splash effect will afford a constant supply of oil to the pockets. In cases of doubt an oil pump feed should be provided.

Drip Feed.

This system may be preferred in a few cases, and the usual sight feed lubricator with regulator can be used. A drain hole should be provided at a suitable height to prevent the collection of excess oil in the housing, which may cause heating up by churning. As this system requires periodical attention the oil level or the circulatory system is preferred.

Oil Pump.

This consists of the usual force pump delivering oil to each bearing housing, and for extreme speeds or high temperature conditions an oil cooler should also be included. This system can be combined advantageously with the automatic circulatory system, to which must be added oil return holes placed at the oil level. This combination provides cool oil with a free circulation suitable for very high speeds, while the oil retained in the housing is available for starting up, or in the event of the failure of the pump.

Atomiser or Spray Device.

By this system oil is delivered to the bearing in the form of a fine spray, either by dried compressed air or mechanical means. It is suggested that for extremely high speeds, where the churning of even a small volume of oil is not permissible, this system has definite possibilities which have not been as yet fully exploited. The spray may be produced by providing a flinger having serrations on its circumference arranged to

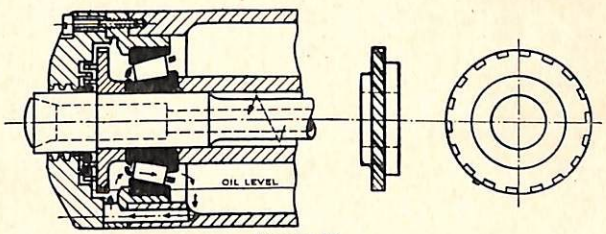


Figure 25

brush lightly the surface of the oil in the housing (Fig. 25). The oil level should be adjusted to give the requisite condition without churning. Communication holes may be necessary to equalise the oil level on each side of the bearing.

SEALS

The success of any anti-friction bearing application depends to some extent upon the degree to which the bearing can be maintained adequately lubricated and free from the presence of foreign matter, such as dust, scale, grit of any sort, water or chemicals. This problem has been considered continuously by British Timken Limited for many years, with the result that a wide variety of seals of the following broad categories can now be recommended :—

I. RUBBING SEALS. 26, 27, 28, 29, 30.

II. NON-RUBBING SEALS. 31, 32, 33, 34.

III. COMBINATION SEALS 34, 35

V. VERTICAL SEALS. 36, 37.

N.B.—Certain of the designs illustrated are suitable for only one type of lubricant. In such cases, the lubricant which applies is stated.

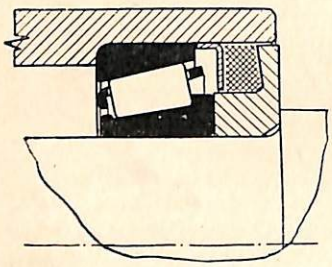


Figure 26

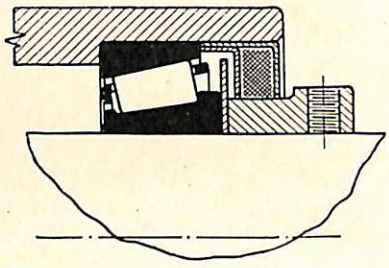


Figure 27

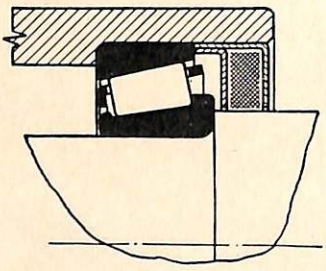


Figure 28

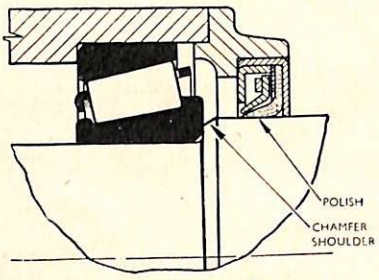


Figure 29

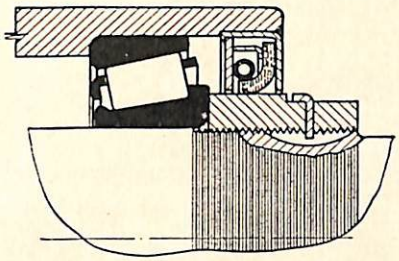


Figure 30

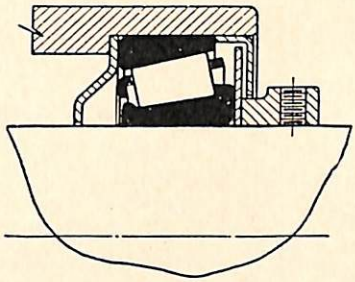


Figure 31 (Grease)

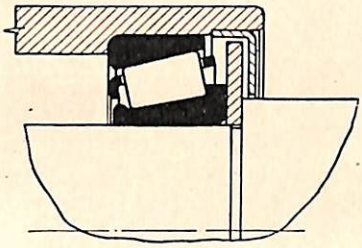


Figure 32 (Grease)

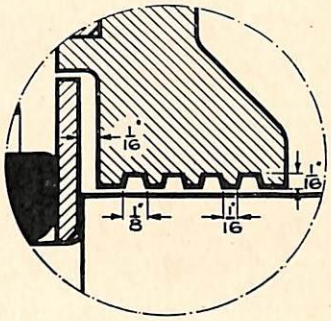


Figure 33. (Oil)

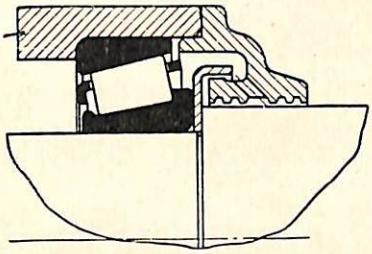


Figure 34 (Oil)

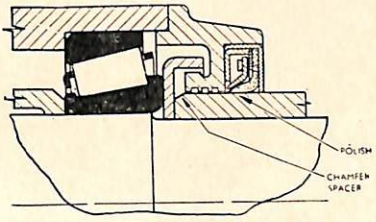


Figure 35

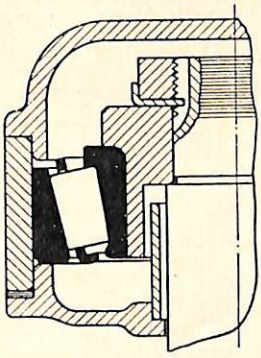


Figure 36

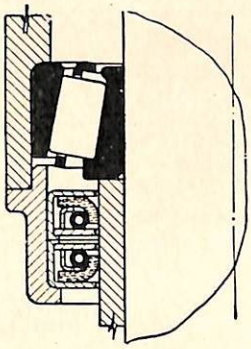


Figure 37

LIMITS OF ACCURACY

Timken Tapered Roller Bearings are manufactured to the following limits of accuracy.

	STANDARD AND PRECISION 5		PRECISION 3	
	Bore	Outside Diameter	Bore	Outside Diameter
Up to and including $3^3/_{16}$" ..	+ ·0006" — ·0000"	+ ·0006" — ·0000"	+ ·0005" — ·0000"	+ ·0005" — ·0000"
Over $3^3/_{16}$" to under 12" ..	+ ·0010" — ·0000"	+ ·0010" — ·0000"	+ ·0005" — ·0000"	+ ·0005" — ·0000"
12" up to and including 14·5"	+ ·0020" — ·0000"	+ ·0020" — ·0000"	+ ·0005" — ·0000"	+ ·0005" — ·0000"
Over 14·5" up to 24" ..	+ ·0020" — ·0000"	+ ·0020" — ·0000"		

TABLE 1

The eccentricity and run out of back face of cup or cone, measured with one race revolving and the other stationary, are as follows :—

	STANDARD		PRECISION 5		PRECISION 3	
	Eccentricity	Run-out	Eccentricity	Run-out	Eccentricity	Run-out
Up to 8" O.D. inclusive ..	·0008"	·0010"	·0005"	·0010"	·0003"	·0005"
Over 8" up to and including $14^1/_2$" O.D.	·0012"	·0018"	·0008"	·0015"	·0003"	·0008"

TABLE 2

TIMKEN TAPERED ROLLER BEARINGS

FITTING PRACTICE

The adjustable feature of the Timken tapered roller bearing allows the running clearance to be adjusted independently of the fits given to the bearing cups and cones. These fits, therefore, can be adapted solely to suit the operating conditions and tight press fits can be given where necessary in a manner rarely possible with ball and cylindrical roller bearings, where the fits are governed in many cases by the internal clearances built into the bearings.

For this reason, the press fits given to Timken Bearing cups and cones are usually heavier than the corresponding fits of ball bearings, resulting in a more active support being afforded by the housing or shaft to the race mounted upon it. In general, it is not necessary to try and obtain the maximum press fit condition. The minimum fit, which should not be reduced, is usually sufficient, while the maximum fit is determined by the tolerances on the two parts concerned, these being added to the minimum fit. Certain basic rules which are enumerated below should be followed in mounting Timken tapered roller bearings. These form a good general guide, but some variation is required at times, where a compromise has to be made to suit conflicting conditions.

CUP—TIGHT PRESS FIT

(a) When the cup housing rotates.
(b) When adjustment is made through the cone.
(c) For heavy thrust or shock loads, in order to obtain the active support of the housing for the bearing cup.

CONE—TIGHT PRESS FIT

(a) When the shaft rotates.
(b) When adjustment is made through the cup.
(c) For heavy thrust or shock loads, in order to obtain the active support of the shaft for the bearing cone.

In other words, the revolving bearing member should be preferably press-fitted into place (to prevent slippage which would set up heating), while the bearing adjustment is made through the non-rotating member.

It is not desirable to have the same degree of tightness or looseness irrespective of size. The tables that follow, therefore, group certain ranges of cup outside diameter and cone bore. Each range is sub-divided to show :—

(i) The dimensions to be applied to the nominal cone bore, or cup outside diameter, to obtain the correct tolerances to which the shaft or cup housing must be machined to give the fit in column ii, Tables 3 and 4.

(ii) The maximum and minimum fits obtained as a result of the adoption of (i) in conjunction with the limits of accuracy on cone bore, or cup outside diameter, as given in Table 1 on page 22.

This information is given in detail in the following tables where a broad classification of applications covering a wide field is given. In all cases the recommendations are based on the adoption of ferrous metal housings and shafts. Where other metals are concerned consult Technical Department for special recommendations.

HOUSINGS (Ferrous)—Recommended CUP Fitting Practice

All Dimensions in Inches

Type of Application		CUP OUTSIDE DIAMETER					
		UP TO 3 3/16"		OVER 3 3/16" TO 6" INCLUSIVE		OVER 6" TO 12"	
		(i) Housing Bore	(ii) Recommended Fit	(i) Housing Bore	(ii) Recommended Fit	(i) Housing Bore	(ii) Recommended Fit
Automotive : Front Wheels, Full Floating Rear Wheels, Pinion, Differential	Non-Adj. Cups	— **·0005 Max.** — **·0015 Min.**	·0005 Tight ·0021 Tight	— **·0010 Max.** — **·0020 Min.**	·0010 Tight ·0030 Tight	— **·0010 Max.** — **·0030 Min.**	·0010 Tight ·0040 Tight
Rear Wheels (Passenger Cars), Transmission, Cross Shaft, Other Applications	Adj. Cups	+ **·0006 Max.** + **·0000 Min.**	·0006 Loose ·0006 Tight	+ **·0010 Max.** + **·0000 Min.**	·0010 Loose ·0010 Tight	+ **·0020 Max.** + **·0000 Min.**	·0020 Loose ·0010 Tight
Industrial :	Adj. Cups		**Size to Size**		**Size to Size**		**Size to Size**
Machine Tool Spindles, Precision 3 Bearings	Non-Adj. Cups	— **·0005 Max.** — **·0010 Min.**	·0005 Tight ·0015 Tight	— **·0005 Max.** — **·0010 Min.**	·0005 Tight ·0015 Tight	— **·0005 Max.** — **·0015 Min.**	·0005 Tight ·0020 Tight
	Floating Cups		**Size Size**		**Size to Size**		**Size to Size**
Transmission, Speed Reducers, Electrical Machinery, Sheaves Crown Blocks, Low Speed, Heavy Duty, Continuous Service, Shock Loads	Adj. Cups	+ **·0010 Max.** + **·0000 Min.**	·0010 Loose ·0006 Tight	+ **·0010 Max.** + **·0000 Min.**	·0010 Loose ·0010 Tight	+ **·0020 Max.** + **·0005 Min.**	·0020 Loose ·0005 Tight
	Non.Adj. Cups	— **·0005 Max.** — **·0015 Min.**	·0005 Tight ·0021 Tight	— **·0010 Max.** — **·0020 Min.**	·0010 Tight ·0030 Tight	— **·0010 Max.** — **·0030 Min.**	·0010 Tight ·0040 Tight
	Floating Cups See Note1	+ **·0020 Max.** + **·0010 Min.**	·0020 Loose ·0004 Loose	+ **·0020 Max.** + **·0010 Min.**	·0020 Loose ·0000 Loose	+ **·0030 Max.** + **·0020 Min.**	·0030 Loose ·0010 Loose
Tractor Front Wheels, Implement Wheels, Etc.	Non-Adj. Cups	— **·0005 Max.** — **·0015 Min.**	·0005 Tight ·0021 Tight	— **·0010 Max.** — **·0030 Min.**	·0010 Tight ·0040 Tight	— **·0010 Max.** — **·0030 Min.**	·0010 Tight ·0040 Tight

TABLE 3

Note 1—For floating cups over 7·500″ outside diameter recommended fit is ·002″ loose to ·004″ loose. Cup seat equals nominal cup outside diameter + ·004″ Max. + ·003″ Min.

TURNED SHAFTS—Recommended CONE Fitting Practice

It is recommended that all shafts be ground on the cone seat. Where this is impossible in the case of transmissions, speed reducers, electrical machinery and all low speed, heavy duty, continuous service applications, or applications subject to shock, using cones with a bore of over 3 3/16″, it is recommended that a minimum shaft diameter should be provided equal to the nominal cone bore plus ·0005″ per inch of cone bore, to which should be added ·001″ to obtain the maximum shaft diameter. In all other cases ground shaft fitting recommendations should be adopted.

GROUND SHAFTS (Ferrous)—Recommended CONE Fitting Practice

All Dimensions in Inches

Type of Application		CONE BORE					
		LESS THAN ⅝"		⅝" TO 3 3/16" INCLUSIVE		OVER 3 3/16" TO 6"	
		(i) Shaft Diameter	(ii) Recommended Fit	(i) Shaft Diameter	(ii) Recommended Fit	(i) Shaft Diameter	(ii) Recommended Fit
Automotive : Rotating Shafts Worm Shaft Pinion, Transmission, Rear Wheels, Cross Shaft	Adj. Cones			+ ·0009 Max. + ·0004 Min.	·0009 Tight ·0002 Loose	+ ·0015 Max. + ·0005 Min.	·0015 Tight ·0005 Loose
	Non-Adj. Cones			+ ·0015 Max. + ·0010 Min.	·0015 Tight ·0004 Tight	+ ·0025 Max. + ·0015 Min.	·0025 Tight ·0005 Tight
Automotive: Rotating Shafts Differential	Non-Adj. Cones			+ ·0025 Max. + ·0015 Min.	·0025 Tight ·0009 Tight	+ ·0035 Max. + ·0025 Min.	·0035 Tight ·0015 Tight
Automotive: Stationary Shafts Front Wheels, Full Floating Rear Wheels, Etc.	Adj. Cones			— ·0002 Max. — ·0007 Min.	·0002 Loose ·0013 Loose	— ·0002 Max. — ·0012 Min.	·0002 Loose ·0022 Loose
Industrial: Rotating Shafts Machine Tool Spindles, Precision 3 Bearings (See Note 1)	Adj. and Non-Adj. Cones	+ ·0005 Max. + ·0000 Min.	·0005 Tight ·0005 Loose	+ ·0013 Max. + ·0008 Min.	·0013 Tight ·0003 Tight	+ ·0013 Max. + ·0008 Min.	·0013 Tight ·0003 Tight
Transmissions, Speed Reducers, Electrical Equipment, Etc.	Adj. Cones	+ ·0005 Max. + ·0000 Min.	·0005 Tight ·0006 Loose	+ ·0015 Max. + ·0010 Min.	·0015 Tight ·0004 Tight	+ ·0025 Max. + ·0015 Min.	·0025 Tight ·0005 Tight
	Non-Adj. Cones	+ ·0005 Max. + ·0000 Min.	·0005 Tight ·0006 Loose	+ ·0015 Max. + ·0010 Min.	·0015 Tight ·0004 Tight	+ ·0025 Max. + ·0015 Min.	·0025 Tight ·0005 Tight
Low Speed, Heavy Duty, Continuous Service Shock, Etc.	Adj. and Non-Adj. Cones			+ ·0025 Max. + ·0015 Min.	·0025 Tight ·0009 Tight	See Notes 2 and 3	See Notes 2 and 3
Industrial: Stationary Shafts Machine Tool Spindles, Precision 3 Bearings (See Note 1)	Adj. and Non-Adj. Cones	+ ·0005 Max. + ·0000 Min.	·0005 Tight ·0005 Loose	+ ·0013 Max. + ·0008 Min.	·0013 Tight ·0003 Tight	+ ·0013 Max. + ·0008 Min.	·0013 Tight ·0003 Tight
Transmissions, Speed Reducers, Electrical Equipment, Etc.	Adj. Cones	+ ·0005 Max. + ·0000 Min.	·0005 Tight ·0006 Loose	+ ·0005 Max. + ·0000 Min.	·0005 Tight ·0006 Loose	+ ·0010 Max. + ·0000 Min.	·0010 Tight ·0010 Loose
	Non-Adj. Cones	+ ·0005 Max. + ·0000 Min.	·0005 Tight ·0006 Loose	+ ·0015 Max. + ·0010 Min.	·0015 Tight ·0004 Tight	+ ·0025 Max. + ·0015 Min.	·0025 Tight ·0005 Tight
Low Speed, Heavy Duty Continuous Service, Shock, Etc.	Adj. and Non-Adj. Cones			+ ·0025 Max. + ·0015 Min.	·0025 Tight ·0009 Tight	See Notes 2 and 3	See Notes 2 and 3
Sheaves, Crown Blocks, Front Wheels, Implement Wheels, Etc.	Adj. Cones			+ ·0000 Max. — ·0005 Min.	·0000 Tight ·0011 Loose	+ ·0000 Max. — ·0010 Min.	·0000 Tight ·0020 Loose

TABLE 4

NOTES.

1—Precision 3 type bearings with a cone bore tolerance of + ·0005"— ·0000" can be furnished only up to and including bearings with cup diameter of 14½".

2—Use turned shaft fitting practice.

3—For cones over 6" bore, consult Technical Department.

4—For N.A. bearings, see special tables, page 72 et seq.

THE SELECTION OF TIMKEN TAPERED ROLLER BEARINGS

Having decided upon the general design of a particular application, a selection has to be made of the most suitable bearings from a load carrying point of view.

To enable such a selection to be made correctly, it is necessary to understand the basis upon which the load capacity ratings of the individual bearings catalogued have been established.

These ratings of Timken Tapered Roller Bearings have been computed from the results of extensive laboratory tests on a fatigue life basis, supplemented by observations of many millions of actual applications under varying conditions.

For convenience, the catalogue ratings are established on the following arbitrary basis :

Expected Minimum Bearing Life ..	500 hours.
Speed	500 r.p.m.
Conditions of application	Good average conditions free from shock or temporary overloads. Constant temperature and efficient lubrication.

Radial and thrust ratings are given for each single row bearing, each rating representing the maximum single resultant load which can be applied to the bearing. In other words, the sum of all radial and thrust loads on the bearing expressed as an equivalent load in either a radial or an axial direction, and adjusted by the appropriate Speed and Service factors, must not exceed the rated capacity of the bearing in the same direction.

In order to calculate the loading of the bearing on the same basis as the catalogue ratings (from the actual working loads), it is necessary to apply the following corrective factors :—

(a) **Life Factor**

This is a co-efficient to enable any desired life expectancy to be adopted. Table 5 gives a range of factors (taking unity as equal to 500 hours) established on the basis of expected life hours before fatigue occurs, the factors being derived from a formula based on the laboratory tests mentioned above.

Tables 7 and 8 give a range of factors established by long experience for various classes of applications, and bearings selected by the appropriate factor given will have an average length of life suitable for the type of machinery concerned.

TABLE OF LIFE FACTORS

Hours Expectancy	Life Factor f.	Hours Expectancy	Life Factor f.	Hours Expectancy	Life Factor f.	Hours Expectancy	Life Factor f.	Hours Expectancy	Life Factor f.	Hours Expectancy	Life Factor f.
100	·616	1200	1·302	2300	1·584	4000	1·870	9500	2·428	45000	3·876
200	·759	1300	1·333	2400	1·604	4500	1·939	10000	2·465	50000	4·000
300	·858	1400	1·364	2500	1·625	5000	2·000	12500	2·637	55000	4·118
400	·935	1500	1·393	2600	1·644	5500	2·059	15000	2·785	60000	4·218
500	**1·000**	1600	1·421	2700	1·663	6000	2·114	17500	2·917	65000	4·331
600	1·057	1700	1·447	2800	1·680	6500	2·166	20000	3·037	70000	4·429
700	1·106	1800	1·469	2900	1·699	7000	2·215	22500	3·147	75000	4·522
800	1·153	1900	1·496	3000	1·716	7500	2·262	25000	3·248	80000	4·611
900	1·194	2000	1·519	3250	1·757	8000	2·304	30000	3·432	85000	4·696
1000	1·232	2100	1·541	3500	1·797	8500	2·347	35000	3·595	90000	4·777
1100	1·268	2200	1·563	3750	1·835	9000	2·389	40000	3·743	95000	4·855

TABLE 5

(b) **Speed Factor**

Unity has been established at 500 r.p.m., and Table 6, page 28, gives the appropriate factors for a wide range of speeds. The maximum speed for general use of each bearing series is given in Tables 9 to 11.

(c) **Application Factor**

As mentioned earlier, the basic ratings are established under good standard operating conditions. The use of an application factor for each class of application enables the basic rating to be brought into consonance with actual conditions, where shock loads, vibrations or periodic peak loads may be encountered. See Tables 7 and 8, pages 30 and 31, for the coefficients determined by experience with Timken Tapered Roller Bearings over a period of approximately fifty years.

The relationship between the catalogue basic rating, the calculated resultant load, and the above three factors is:—

$$\left.\begin{matrix}\text{Required}\\ \text{Catalogue}\\ \text{Basic}\\ \text{Rating}\end{matrix}\right\} = \frac{\text{Calculated Load} \times \text{Life Factor} \times \text{Application Factor}}{\text{Speed Factor}} \quad \cdots\cdots\cdots 1$$

For convenience, in Tables 7 and 8, the Life and Application Factors have been combined in a Service Factor, which is the only factor (apart from that applying to the speed) that need be taken into consideration unless it is desired to select a bearing for some special Life condition. In general, however, the Life and Application Factors will remain constant for a particular type of application, and it is convenient, therefore, to treat these as one Service Factor, which is, in effect, a factor of safety for the bearings in that application, and may be used directly as such.

TABLE OF SPEED FACTORS

For Bearing Rating at any Speed, Multiply Catalogue Rating at 500 R.P.M. by appropriate Factor from Table below.

For Ratings for Different Operating Conditions, Consult Service Factors on Pages 30 & 31.

R.P.M.	Factor	R.P.M.	Factor	R.P.M.	Factor	R.P.M.	Factor	R.P.M.	Factor	R.P.M.	Factor
		215	1·288	600	·947	1050	·800	2100	·650	3150	·576
10	3·233	220	1·279	610	·942	1075	·795	2125	·648	3175	·574
15	2·863	225	1·271	620	·938	1100	·789	2150	·646	3200	·573
20	2·626	230	1·262	630	·933	1125	·784	2175	·643	3225	·572
25	2·456	235	1·254	640	·929	1150	·779	2200	·641	3250	·570
30	2·326	240	1·246	650	·924	1175	·774	2225	·639	3275	·569
35	2·220	245	1·239	660	·920	1200	·769	2250	·637	3300	·568
40	2·134	250	1·231	670	·916	1225	·764	2275	·635	3325	·566
45	2·059	260	1·217	680	·912	1250	·760	2300	·633	3350	·565
50	2·000	270	1·203	690	·908	1275	·755	2325	·631	3375	·564
55	1·939	280	1·190	700	·904	1300	·751	2350	·629	3400	·563
60	1·889	290	1·178	710	·900	1325	·747	2375	·627	3425	·561
65	1·845	300	1·166	720	·896	1350	·742	2400	·625	3450	·560
70	1·804	310	1·154	730	·893	1375	·738	2425	·623	3475	·559
75	1·767	320	1·143	740	·889	1400	·734	2450	·621	3500	·558
80	1·733	330	1·133	750	·885	1425	·730	2475	·619	3525	·557
85	1·700	340	1·123	760	·882	1450	·727	2500	·617	3550	·555
90	1·673	350	1·113	770	·879	1475	·723	2525	·615	3575	·554
95	1·646	360	1·104	780	·875	1500	·719	2550	·613	3600	·553
100	1·621	370	1·095	790	·872	1525	·716	2575	·612	3625	·552
105	1·597	380	1·086	800	·869	1550	·712	2600	·610	3650	·551
110	1·575	390	1·078	810	·865	1575	·709	2625	·608	3675	·550
115	1·554	400	1·069	820	·862	1600	·705	2650	·606	3700	·549
120	1·535	410	1·061	830	·859	1625	·702	2675	·605	3725	·547
125	1·516	420	1·054	840	·856	1650	·699	2700	·603	3750	·546
130	1·498	430	1·046	850	·853	1675	·696	2725	·601	3775	·545
135	1·481	440	1·039	860	·850	1700	·693	2750	·600	3800	·544
140	1·465	450	1·032	870	·847	1725	·690	2775	·598	3825	·543
145	1·450	460	1·025	880	·844	1750	·687	2800	·596	3850	·542
150	1·435	470	1·019	890	·841	1775	·684	2825	·595	3875	·541
155	1·421	480	1·012	900	·838	1800	·681	2850	·593	3900	·540
160	1·408	490	1·006	910	·836	1825	·678	2875	·592	3925	·539
165	1·395	**500**	**1·000**	920	·833	1850	·675	2900	·590	3950	·538
170	1·382	510	·994	930	·830	1875	·673	2925	·589	3975	·537
175	1·370	520	·988	940	·827	1900	·670	2950	·587	4000	·536
180	1·359	530	·983	950	·825	1925	·667	2975	·586	4250	·526
185	1·348	540	·977	960	·822	1950	·665	3000	·584	4500	·517
190	1·337	550	·972	970	·820	1975	·662	3025	·583	4750	·509
195	1·327	560	·967	980	·817	2000	·660	3050	·581	5000	·501
200	1·317	570	·962	990	·815	2025	·657	3075	·580	—	—
205	1·307	580	·956	1000	·812	2050	·655	3100	·578	—	—
210	1·297	590	·952	1025	·806	2075	·653	3125	·577	—	—

TABLE 6

When selecting bearings, the following must be noted :—

(a) **Where the calculated load is purely radial,** adopt formula **1** and select on the basis of the radial rating given in the catalogue. Type " S " bearings are generally used.

(b) **Where the calculated load is purely thrust,** adopt formula **1** and select on the basis of the thrust rating given in the catalogue. Type " SS " or type " T " bearings are generally used.

(c) When a **pair of bearings A and B** of the same series are **subjected to equal pure radial loads,** the thrust reactions in the bearings will equalise each other and may be neglected. When A and B are of different capacity or are subjected to **unequal pure radial loads,** however, there will be an unbalanced thrust reaction which must be taken up by one bearing, and this must be calculated. If the larger load is applied to the bearing A, the thrust reaction on B may be calculated as follows :—

$$\text{Resultant thrust on B} = \frac{0{\cdot}34 \times \text{Radial load on A}}{K_A} \quad \ldots\ldots\ldots\ldots \quad \mathbf{2}$$

$$\text{Where } K_A = \frac{\text{Radial Rating of A}}{\text{Thrust Rating of A}}$$

The total resultant load will then be calculated in accordance with formula **3**. Type " S " bearings are bearings generally used.

(d) When a **bearing is subjected to combined radial and thrust loads**—whether externally applied, or arising as reactions to applied loads, it is necessary to calculate the equivalent radial load corresponding to these combined loads.

Where, however, the ratio of thrust to radial load is 17 per cent. or less the thrust load may be ignored and the bearings selected as explained above for pure radial load (formula **1**) and " S " type bearings used.

If the ratio of thrust to radial load lies between 17 per cent. and 34 per cent. then the equivalent radial load is calculated as follows :—

$$\text{Equivalent Radial load} = 0{\cdot}66 \text{ Radial Load} + K \times \text{Thrust Load} \quad \ldots\ldots\ldots\ldots \quad \mathbf{3}$$

$$\text{Where } K = \frac{\text{Radial Rating}}{\text{Thrust Rating}}$$

When it is found by the use of this formula that the equivalent radial load is less than the applied radial load, then the latter should be treated as the equivalent radial load and the bearing chosen accordingly. When calculating the equivalent radial load on a bearing, a value of K must first be assumed, viz., 1·5 for " S " type bearings or 0·75 for steep angle (high thrust capacity) bearings, until a tentative bearing selection has been made, and this selection checked finally by substituting the proper value of K. K values for each bearing series are given in tables 9 to 11 on pages 35 to 37.

It may be necessary to repeat the process before a suitable bearing is found.

Factors For Use With Ratings of Timken Tapered Roller Bearings (see page 27)

APPLICATION	Life Factor	× Application Factor	= Service Factor
Aeroplanes			
Wheels—Consult Technical Department	—	—	0·7
Rocker Arms—Consult Technical Department Landing Gears, Controls, etc.	1·75	1·0	1·75
Amusement Devices (Supporting Wheels)	2·5	1·0	2·5
Automotive Wheels (also Trailing Wheels)	1·75	1·4	2·5
Differentials—Dual Reduction Cross Shafts	1·75	1·75	3·0
Pinions, Worms and Transmissions	1·75	1·0	1·75
Bakery and Restaurant Machinery			
Dough Mixers, etc.	3·5	1·0	3·5
Meat Slicers, Potato Peelers, etc.	1·75	1·0	1·75
Belt Drives			
Special Drives—Use same factor as equipment driven			
General Purpose Units	2·5	1·0	2·5
Blowers (see Fans, Blowers and Compressors)			
Clay Working Machinery	2·5	2·0	5·0
Colliery Headgear Sheaves	3·5	1·0	3·5
Compressors (see Fans, Blowers and Compressors)			
Conveyors			
Drives—Use Standard Reduction Units			
Rolls—Consult Conveyor Section of the Timken Handbook			
Cranes (see I-Beam Trolleys, Hoists and Cranes)			
Electric Lifts	3·5	1·0	3·5
Electric Vans (Battery Driven)	1·75	1·0	1·75
Engines (Gas, Oil and Steam Engines figured on Normal Pressure equal to ·6 Maximum Pressure)			
Farm and Industrial Engines—Gas or Oil	2·5	1·0	2·5
Industrial Engines—Steam	3·5	1·0	3·5
Oil Field Engines—Gas, Oil or Steam	3·5	1·0	3·5
Fans, Blowers and Compressors (Compressors figured on M. E. P.)			
Fans and Blowers	3·5	1·0	3·5
Large Stationary Compressors	5·0	1·0	5·0
Garage Compressors	3·5	1·0	3·5
Farm Machinery (Excluding Tractors)	1·75	2·0	3·5
Farm Tractors			
Transmission (Use ·8 B. H. P.)	1·75	1·0	1·75
Wheels	2·5	1·4	3·5
Gear Reduction Units			
Special Drives—Use same factor as equipment driven			
General Purpose Units	2·5	1·0	2·5
Glass Making Machinery	3·5	1·0	3·5
Grain Milling Machinery			
Mill Equipment	3·5	1·0	3·5
Elevator Equipment	3·5	1·0	3·5
Feed Grinders, Hammer Mills, etc.	2·5	1·4	3·5
Hoists (see I-Beam Trolleys, Hoists and Cranes)			
Horse Drawn Vehicles	2·0	1·0	2·0
Household Appliances	1·75	1·0	1·75
I-Beam Trolleys, Hoists and Cranes	2·5	1·0	2·5
Crane Hooks—see pages 76 and 77			
Ice Making Machinery (Compressors figured on M. E. P.)	3·5	1·0	3·5
Industrial Trucks (see Shop or Industrial Trucks)			
Laundry Machinery—Commercial	3·5	1·0	3·5
Lawn Mowers	1·75	1·0	1·75
Leather Working Machinery	3·5	1·0	3·5

TABLE 7

Factors For Use With Ratings of Timken Tapered Roller Bearings *(Continued)*

(see page 27)

APPLICATION	Life Factor	× Application Factor	= Service Factor
Locomotives—Mine and Industrial	3·5	1·0	3·5
Logging Blocks and Logging Engines			
Blocks	1·75	1·0	1·75
Engines	3·5	1·0	3·5
Machine Tools			
Factory Tools	3·5	1·0	3·5
Portable Tools	1·75	1·0	1·75
Mine Cars	1·75	2·0	3·5
Motor-cycles and Side Cars—Use Automotive Factors			
Oil Field Equipment—Consult Technical Department			
Paper Mill Machinery	5·0	1·4	7·0
Printing Machinery	3·5	1·5	5·25
Pulverizing and Screening Equipment			
Rock Crushers, Pulverizers and Screens	2·5	1·4	3·5
Coal Pulverizers	2·5	1·4	3·5
Cement Plant Equipment	3·5	1·0	3·5
Pumps			
Paper Mill Pumps	5·0	1·4	7·0
Spray Pumps	1·75	1·0	1·75
Deep Well Pumps	3·5	1·0	3·5
Fire Pumps	3·5	1·0	3·5
Dredge Pumps	3·5	1·5	5·25
Household Pumps	1·75	1·0	1·75
Railway Equipment—Consult Railway Axlebox Brochure			
Refrigerating Machinery (see Ice Making Machinery)			
Restaurant Machinery (see Bakery and Restaurant Machinery)			
Road Building Machinery			
Shovels, Mixers, Rollers	1·75	1·0	1·75
Graders, Scrapers, etc. (Wheels)	1·75	2·0	3·5
Wheels (Heavy Service)	1·75	2·0	3·5
Wheels (Light Service)	1·75	1·0	1·75
Rope Sheaves	1·75	1·0	1·75
Rubber Machinery (Calculated on Maximum Loads)	3·5	1·5	5·25
Saw Mill and Woodworking Machinery	3·5	1·0	3·5
Screening Equipment (see Pulverizing and Screening Equipment)			
Shop or Industrial Trucks			
Heavy Shop Trucks and Trailers	2·5	1·0	2·5
Light Shop Trucks and Trailers	1·75	1·0	1·75
Steel Mill Machinery			
Roll Necks —Consult Technical Department			
Pinion Stands (Calculated on 100 per cent Overload at Normal Speed)	2·25	1·0	2·25
Gear Drives (Calculated on 100 per cent Overload at Normal Speed)	2·25	1·0	2·25
Miscellaneous Equipment	2·25	1·0	2·25
Stokers			
Commercial Stokers	2·5	1·4	3·5
Household Stokers	1·75	1·0	1·75
Textile Machinery	3·5	1·0	3·5
Trailers			
Highway (Very heavy type—solid tyres)	1·75	2·0	3·5
Highway	1·75	1·4	2·5
Industrial (See Shop or Industrial Trucks)			
Transmission Machinery—(General)—Use Factor appropriate to Industry			
Woodworking Machinery (see Saw Mill and Woodworking Machinery)			

TABLE 8

SUMMARY OF METHOD OF SELECTION

The general procedure when choosing a bearing is, therefore, as follows :—

(1) Calculate the applied radial and thrust loads which the bearing has to carry basing the calculations as far as possible on the **average** conditions under which the bearing will have to operate.

(2) If the bearing is to be subjected to combined radial and thrust loads, calculate the equivalent radial load according to formulae **2** and **3**.

(3) Ascertain the Service and Speed (i.e., Life and Application) Factors from tables 6, 7 and 8.

(4) Calculate the required catalogue rating according to formula **1**.

(5) Choose the bearing from this catalogue which has the same, or the nearest higher, rating to the required calculated rating, and is of dimensions best suited to the application under consideration.

In a case where the **Ratio of Thrust to Radial Load** exceeds 34 per cent., it is more convenient to calculate the combined loads as an equivalent thrust load using the following :—

$$\text{Equivalent Thrust Load} = \text{Thrust Load} + \frac{0{\cdot}66 \text{ Radial Load}}{K}$$

Generally, bearings of type " SS " should be used for this condition of loading.

BEARING TABLES

Before consulting the tables of bearings and the List of Series, pages 35 to 37, it is important to understand the principles followed.

The tapered construction of the bearing allows of considerable variation in both internal and external characteristics. Internal changes may be

(a) increase or decrease of the number and proportions of rollers which has a proportionate effect upon load carrying capacity, or

(b) variations of the race and roller angles which will change the ratio of the radial to thrust capacity.

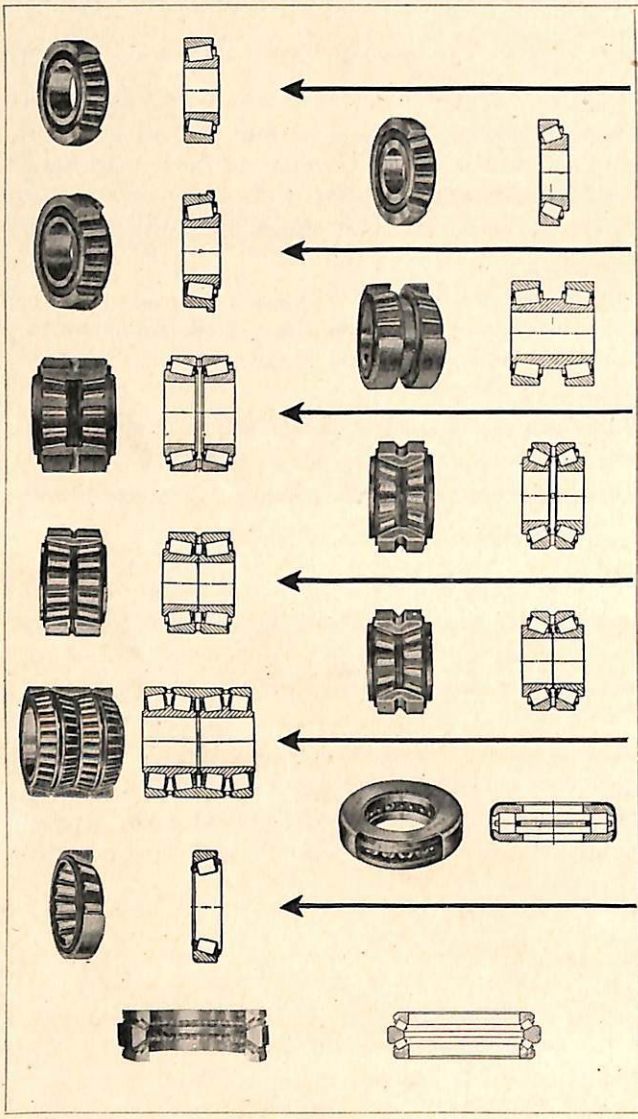
External changes to the outside diameter, bore, or even the overall width, may be made, either retaining the internal characteristics or modifying them.

In actual practice it has been found convenient to adopt certain internal characteristics as standard, and a group of bearings having the same quantity and size of rollers, and a constant angle, but varying only in bore, or outside diameter, and in some cases width, has been designated a " series."

It follows, therefore, that the bearings of any one series, having the same rollers and cage, have the same capacity for both radial and thrust loads. In any given series any cup will function perfectly with any cone, and designers have therefore a variety of cone bores and cup outside diameters in most series from which to select a bearing for a specific application.

It will be noted that bearing numbers in the following tables are shown in light and heavy type. Those in heavy type are bearings in high production and should be used on all occasions when new designs are being considered. Those in light type are intended only for replacement purposes.

TIMKEN TAPERED ROLLER BEARINGS — Types



TAPERED ROLLER BEARINGS	
SINGLE ROW INCH AND METRIC DIMENSIONS	Type S
SINGLE ROW STEEP ANGLE	Type SS
SINGLE ROW FLANGED CUP	Type SF
TWO ROW DOUBLE CONE	Type DI
TWO ROW DOUBLE CUP	Type DO
TWO ROW DOUBLE CUP STEEP ANGLE	Type DOS
TWO ROW DOUBLE CUP NON-ADJUSTABLE	Type NA
TWO ROW DOUBLE CUP STEEP ANGLE NON-ADJUSTABLE	Type NAS
FOUR ROW	Type QO
FLAT THRUST	Type T
STEERING GEAR	
V.P. AIRSCREW	

LIST OF SERIES

Series Number	Rating at 500 r.p.m.		Factor K	† Maximum Speed for General Use	Page No.
	Radial lbs.	Thrust lbs.			
LY65	11775	8910	1·32	3,000	38/39
155	1785	1105	1·62	10,000	"
245	2400	1135	2·11	5,000	"
335	3690	1985	1·86	5,000	"
355	3860	2320	1·67	5,000	"
365	3860	2425	1·59	5,000	"
375	4015	2670	1·51	4,500	"
385	4195	2910	1·44	4,000	"
395	4500	3540	1·27	4,000	"
415	5270	2735	1·93	5,000	"
435	5565	3100	1·80	4,500	"
455	6120	4020	1·52	4,000	"
475	6885	5190	1·33	3,500	40/41
495	7590	6600	1·13	3,000	"
525	7740	4330	1·79	4,000	"
535	8140	4725	1·72	3,500	"
555	8875	6040	1·47	3,000	"
565	9250	6580	1·40	2,500	"
575	9560	7565	1·28	2,500	"
595	10550	9150	1·15	2,000	"
615	10400	6390	1·62	3,500	"
635	11330	8050	1·40	3,000	"
655	12230	9810	1·25	2,500	42/43
675	13020	12030	1·08	2,000	"
745	15050	9600	1·57	2,000	"
755	15700	10500	1·50	2,000	"
775	16300	12320	1·32	1,750	"
795	19250	17300	1·11	1,500	"
835	20450	11980	1·71	1,750	"
855	21300	14650	1·52	1,750	"
935	26275	16775	1·57	1,500	"
1100	1660	795	2·09	5,000	"
1300	2050	1170	1·75	5,000	"
1600	2510	1825	1·38	5,000	"
1700	2165	1310	1·66	5,000	44/45
1900	2170	1395	1·55	5,000	"
A2000	550	440	1·24	7,000	"
2300	3090	1405	2·20	5,000	"
2400	3070	2040	1·51	5,000	"
[illegible]	3680	1975	1·86	4,500	"
				5,000	"
					"
					"
					46/47
					"
					"
					"
					"

Please note that the capacity ratings published on page 35 are the revised figures, and that they therefore include the 25% increase announced in May, 1948.

esigners

LIST OF SERIES

Series Number	Rating at 500 r.p.m.		Factor K	† Maximum Speed for General Use	Page No.
	Radial lbs.	Thrust lbs.			
LY65	11775	8910	1·32	3,000	38/39
155	1785	1105	1·62	10,000	"
245	2400	1135	2·11	5,000	"
335	3690	1985	1·86	5,000	"
355	3860	2320	1·67	5,000	"
365	3860	2425	1·59	5,000	"
375	4015	2670	1·51	4,500	"
385	4195	2910	1·44	4,000	"
395	4500	3540	1·27	4,000	"
415	5270	2735	1·93	5,000	"
435	5565	3100	1·80	4,500	"
455	6120	4020	1·52	4,000	"
475	6885	5190	1·33	3,500	40/41
495	7590	6600	1·15	3,000	"
525	7740	4330	1·79	4,000	"
535	8140	4725	1·72	3,500	"
555	8875	6040	1·47	3,000	"
565	9250	6580	1·40	2,500	"
575	9560	7565	1·26	2,500	"
595	10550	9150	1·15	2,000	"
615	10400	6390	1·62	3,500	"
635	11330	8050	1·40	3,000	"
655	12230	9810	1·25	2,500	42/43
675	13020	12030	1·08	2,000	"
745	15050	9600	1·57	2,000	"
755	15700	10500	1·50	2,000	"
775	16300	12320	1·32	1,750	"
795	19250	17300	1·11	1,500	"
835	20450	11980	1·71	1,750	"
855	21300	14650	1·52	1,750	"
935	26275	16775	1·57	1,500	"
1100	1660	795	2·09	5,000	"
1300	2050	1170	1·75	5,000	"
1600	2510	1825	1·38	5,000	"
1700	2165	1310	1·68	5,000	44/45
1900	2170	1395	1·55	5,000	"
A2000	550	440	1·24	7,000	"
2300	3090	1405	2·20	5,000	"
2400	3070	2040	1·51	5,000	"
2500	3680	1975	1·86	4,500	"
2600	3490	1740	2·01	5,000	"
2700	3870	2310	1·68	4,000	"
3100	4615	3000	1·54	5,000	"
3300	5295	2830	1·87	4,000	"
3400	4860	3475	1·40	4,000	"
3500	5280	3175	1·67	3,500	46/47
3700	5780	3830	1·51	3,000	"
3800	5320	4210	1·26	3,500	"
3900	6550	5180	1·27	2,500	"
A4000	625	550	1·14	7,000	"
A6000	645	665	0·97	7,000	"
6200	15130	8840	1·71	3,000	"

† These speeds may often be exceeded under special conditions and in such circumstances designers are advised to consult the Technical Department.

TABLE 9

LIST OF SERIES *(Continued)*

Series Number	Rating at 500 r.p.m.		Factor K	† Maximum Speed for General Use	Page No
	Radial lbs.	Thrust lbs.			
6300	15945	10145	1·57	3,000	46/47
6400	17510	12420	1·41	2,500	"
9300	14040	21075	·67	2,000	"
00000	975	525	1·86	8,000	"
02400	2760	2250	1·22	5,000	"
02800	3015	2690	1·12	5,000	"
03000	1050	645	1·63	8,000	"
05000	1245	868	1·43	7,500	"
07000	1310	1030	1·27	7,500	48/49
08000	1420	1310	1·08	7,000	"
09000	1800	945	1·91	5,000	"
11000	2230	2125	1·05	5,000	"
14000	2285	1720	1·33	5,000	"
15000	2395	1650	1·45	6,000	"
15000R	2395	1650	1·45	6,000	"
16000	2500	1975	1·27	6,000	"
17000	1975	1482	1·33	5,000	"
17500	1360	880	1·55	5,000	"
19000	2145	1870	1·15	5,000	"
21000	2190	2545	·86	5,000	"
23000	2415	3510	·69	4,000	"
24700	3510	·2710	1·30	5,000	"
25500	4400	2920	1·51	4,000	50/51
25800	3870	2210	1·75	4,500	"
26000	2595	1835	1·42	7,500	"
27800	3580	3950	·91	5,000	"
28000	2850	2240	1·27	7,000	"
31500	4620	3645	1·27	4,000	"
33000	6865	5880	1·17	2,500	"
34000	4780	4225	1·13	3,500	"
35000	3690	2160	1·71	5,000	"
36000	4620	3165	1·46	4,000	"
39000	4345	3310	1·31	4,000	"
41000	3295	3895	·85	5,000	"
43000	3670	4810	·76	4,500	"
44000	3790	5790	·65	4,000	"
49000	5920	4190	1·41	4,000	"
52000	10850	10100	1·07	1,750	52/53
53000	4610	6700	·69	3,500	"
55000	4920	8540	·58	3,000	"
59000	7680	6060	1·27	3,500	"
64000	14200	14400	·99	1,750	"
69000	8910	7480	1·21	3,000	"
71000	18120	14760	1·23	1,500	"
72000	7210	10425	·69	3,000	"
74000	19730	18900	1·05	1,000	"
78000	8565	14550	·59	2,500	"
81000	19200	13260	1·45	1,750	"
82600	25700	22280	1·15	1,000	"
88000	24600	23500	1·05	750	"
93000	37900	38925	·97	750	"
94000	35070	32175	1·09	750	54/55
95000	28635	20745	1·38	1,250	"
97000	19700	28500	·69	1,500	"

† These speeds may often be exceeded under special conditions and in such circumstances designers are advised to consult the Technical Department.

TABLE 10

LIST OF SERIES *(Continued)*

Series Number	Rating at 500 r.p.m.		Factor K	† Maximum Speed for General Use	Page No.
	Radial lbs.	Thrust lbs.			
98000	19300	23900	·81	2,000	54/55
99000	30885	24655	1·25	1,000	,,
115000	104500	71200	1·47	*	,,
116000	29610	21350	1·38	1,000	,,
117000	56540	78340	·72	*	,,
126000	51300	52000	·99	*	,,
129000	50400	41100	1·23	*	,,
130000	43400	28100	1·54	*	,,
133000	38930	36625	1·06	*	,,
HM144100	57455	32335	1·78	*	,,
HH144600	100300	58600	1·71	*	56/57
153000	35600	22400	1·59	750	,,
170000	28750	20450	1·41	*	,,
175000	73700	54800	1·34	250	,,
192000	36350	38000	·96	*	,,
195000	29825	79000	·38	*	,,
197000	27250	57185	·48	*	,,
204000	49850	41300	1·21	*	,,
215000	29000	39800	·73	1,500	,,
217000	35475	27955	1·27	*	,,
220000	48750	37700	1·29	*	,,
224000	117000	75250	1·56	*	,,
250000	41400	26900	1·54	*	,,
270000	45790	29880	1·60	*	,,
275000	48690	38380	1·27	*	,,
277000	303600	215000	1·41	*	,,
280000	33450	23620	1·42	1,000	,,
295000	125440	76960	1·63	*	,,
328000	198000	156400	1·27	*	58/59
420000	60800	47750	1·27	*	,,
424000	354500	219000	1·62	*	,,
428000	417400	253900	1·66	*	,,
430000	64400	55650	1·16	*	,,
433000	483750	365000	1·33	*	,,
450000	48200	30900	1·56	750	,,
470000	52500	37650	1·40	*	,,
516000	41600	59625	·70	*	,,
526000	67700	51900	1·31	*	,,
528000	573000	400000	1·43	*	,,
540000	46925	36650	1·28	750	,,
550000	60600	39500	1·53	*	,,
560000	45600	41400	1·10	*	,,
580000	43650	37200	1·18	*	,,
590000	47350	46200	1·03	*	,,
626000	182400	158950	1·15	*	,,
670000	170200	131000	1·30	*	,,
673000	58800	47400	1·24	*	60/61
715000	615000	381150	1·61	*	,,
722000	78400	58000	1·35	*	,,
750000					,,
822000	65800	44100	1·49	*	,,
833000	146500	93500	1·56	*	,,
940000	76250	60150	1·27	*	,,
980000	106250	98560	1·08	*	,,

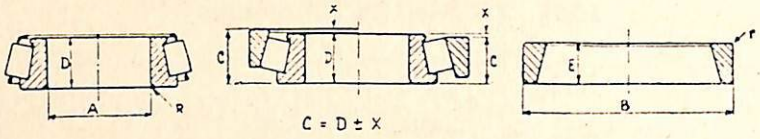
*—Consult the Technical Department

† These speeds may often be exceeded under special conditions and in such circumstances designers are advised to consult the Technical Department.

TABLE 11

CONES

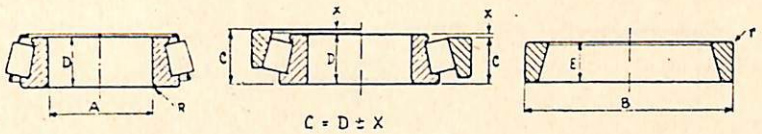
(In numerical sequence)



Cone No.	Bore A ins.	m/m	Length D ins.	Radius R ins.	Weight lb.	Price £ s. d.
LY65 SERIES						
LY70	3·0000		1·815	9/64	3·960	**2 10 0**
LY72	2·8750		2·065	13/64	4·720	**2 4 9**
LY73	2·5591	65	1·877	9/64	5·000	**2 10 0**
LY77	2·6250		2·065	9/64	5·370	**2 10 0**
LY79	3·1250		1·815	9/64	3·620	**2 10 0**
155 SERIES						
157	·7874	20	·638	1 m/m	·230	**0 13 0**
245 SERIES						
0247	1·0000		·748	2 m/m	·384	**0 14 3**
247	·9842	25	·748	2 m/m	·380	**0 14 3**
248X	·8119		·748	2 m/m	·448	**0 14 3**
335 SERIES						
335	1·3750		·889	1/32	·830	**0 17 6**
337	1·5000		·889	1/32	·760	**0 17 3**
337S	1·5000		·939	1/32	·806	**0 17 6**
342	1·6250		·889	9/64	·563	**0 16 3**
344	1·5748	40	·889	2 m/m	·706	**0 17 6**
355 SERIES						
350	1·5748	40	·854	5/32	·855	**1 0 3**
355X	1·7500		·854	9/64	·750	**0 18 9**
NA357 Non-adjustable (see page 72)					·956	**1 9 0**
358	1·7717	45	·854	2 m/m	·730	**0 19 3**
359S	1·8125		·854	3/32	·700	**0 18 9**
365 SERIES						
365	1·9685	50	·875	2 m/m	·740	**1 0 6**
368A	2·0000		·875	9/64	·718	**1 0 6**
369S	1·8750		·875	3/32	·800	**1 0 6**
375 SERIES						
375	2·0000		·877	3/32	·870	**1 0 3**
376	1·7717	45	·877	2 m/m	1·030	**1 0 9**
377	2·0625		·877	3/32	·820	**1 0 3**
385 SERIES						
385	2·1654	55	·889	2 m/m	·947	**1 1 0**
387	2·2500		·889	3/32	·876	**1 1 0**
395 SERIES						
395	2·5000		·889	9/64	1·210	**1 1 8**
395S	2·6250		·889	9/64	1·098	**1 1 8**
415 SERIES						
418	1·5000		1·145	9/64	1·045	**1 1 11**
419	1·6250		1·145	9/64	·943	**1 0 5**
422	1·5625		1·145	9/64	1·000	**1 1 4**
435 SERIES						
436	1·8125		1·177	9/64	1·089	**1 4 1**
438	1·7500		1·177	9/64	1·136	**1 3 1**
NA438 Non-adjustable (see page 72)					1·176	**1 12 6**
444	1·5000		1·177	9/64	1·342	**1 4 1**
447	1·6250		1·177	9/64	1·243	**1 0 10**
455 SERIES						
455	2·0000		1·162	1/32	1·702	**1 6 9**
NA455 Non-adjustable (see page 72)					1·811	**2 0 0**
456	2·1250		1·162	9/64	1·578	**1 4 3**
460	1·7500		1·162	9/64	1·945	**1 5 0**
462	2·2500		1·162	3/32	1·446	**1 8 9**
463	1·8750		1·162	3/16	1·835	**1 6 0**

CUPS

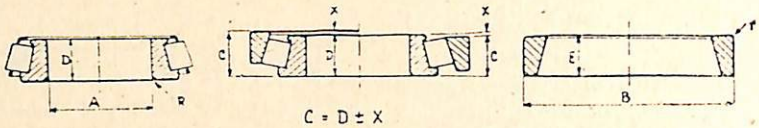
(In numerical sequence)



Cup No.	Cup O/D B ins.	m/m	Length E ins.	Radius r ins.	Standout of Ass. Cone X ins.	Weight lb.	Price £ s. d.
LY62A	5·5960		1·3125	1/8	—·065	2·362	**1 10 0**
LY63A	5·5118	140	1·3125	1/8	—·065	2·084	**1 10 0**
153	2·0473	52	·5905	1 m/m	—·047	·146	**0 6 0**
0243	2·5000		·7500	2 m/m	+·002	·293	**0 7 3**
243	2·4410	62	·6693	2 m/m	—·079	·210	**0 7 3**
244X	2·4375		·6875	1/8	+·080	·235	**0 7 3**
0332US	3·3750		·7018	3/32	—·062	·539	**0 10 0**
332US	3·1496	80	·7018	2 m/m	—·062	·313	**0 10 6**
3320	3·1562		·9375	1/8	+·174	·470	**0 10 0**
352	3·5480		·8586	3/32	+·052	·701	**0 12 9**
353	3·5433	90	·9055	2 m/m	+·052	·719	**0 11 3**
353D	Double cup	(see page 72)				1·472	**1 5 6**
354A	3·3465	85	·6875	1/16	—·041	·354	**0 9 6**
354B	Flanged cup	(see page 75)				·418	**0 13 6**
362	3·5433	90	·6250	2 m/m	—·088	·380	**0 10 9**
362A	3·5000		·6500	3/64	—·062	·362	**0 10 9**
362B	Flanged cup	(see page 75)				·440	**0 16 0**
372A	3·8125		·7500	1/16	—·002	·639	**0 13 6**
382	3·8750		·7020	1/32	—·062	·493	**0 12 0**
382B	Flanged cup	(see page 75)				·477	**0 18 0**
383A	3·9370	100	·7020	2 m/m	—·062	·540	**0 12 0**
384ED	Double cup	(see page 70)				1·291	**1 7 6**
394AX	4·3307	110	·7411	3/64	—·023	·570	**0 18 6**
414	3·4843		·8750	1/16	—·082	·717	**0 12 11**
414X	3·5433	90	·8750	2 m/m	—·082	·795	**0 12 11**
432	3·7500		·8750	3/32	—·083	·835	**0 13 10**
432D	Double cup	(see page 72)				1·926	**1 10 6**
452D	Double cup	(see page 72)				2·400	**2 0 0**
453A	4·2500		·8750	3/32	—·068	·930	**1 0 0**
453B	Flanged cup	(see page 75)				1·019	**1 10 0**
453DW	Double cup	(see page 70)				3·287	**4 7 7**
453XS	4·1250		·9688	1/8	+·026	·818	**1 0 0**
454A	4·3307	110	·8750	2 m/m	—·068	1·070	**0 16 10**

CONES *(Continued)*

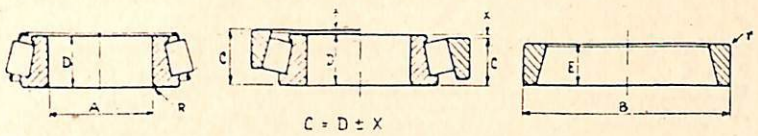
(In numerical sequence)



Cone No.	Bore A ins.	Bore A m/m	Length D ins.	Radius R ins.	Weight lb.	Price £ s. d.
475 SERIES						
476	2·3622	60	1·142	2 m/m	2·247	**1 9 9**
477	2·5000		1·142	1/32	2·085	**1 10 3**
478	2·5591	65	1·142	3/32	2·000	**1 7 3**
478S	2·6250		1·142	2 m/m	1·921	**1 7 3**
480	2·6875		1·142	9/64	1·795	**1 7 3**
482	2·7500		1·142	9/64	1·726	**1 7 3**
484	2·7559	70	1·142	·080	1·730	**1 7 3**
495 SERIES						
495	3·2500		1·172	9/64	2·349	**1 19 9**
496	3·1875		1·172	9/64	2·449	**1 19 9**
498	3·3125		1·172	9/64	2·243	**1 19 9**
525 SERIES						
526	1·6250		1·420	9/64	2.166	**1 10 0**
527	1·7500		1·420	9/64	2·045	**1 10 0**
529X	2·0000		1·420	9/64	1·734	**1 10 0**
535 SERIES						
535	1·7500		1·455	9/64	2·344	**1 11 3**
536	1·8750		1·455	9/64	2·180	**1 11 3**
537	2·0000		1·455	9/64	2·034	**1 11 3**
538	2·1654	55	1·455	9/64	1·813	**1 11 3**
538US	2·1650		1·455	9/64	1·813	**1 11 3**
539	2·1250		1·455	9/64	1·865	**1 11 3**
NA539 Non-adjustable (see page 72)					1·940	**2 2 0**
555 SERIES						
555S	2·2500		1·444	9/64	3·033	**1 17 0**
558	2·3750		1·444	3/32	2·823	**1 17 6**
NA558 Non-adjustable (see page 72)					2·958	**2 13 0**
559	2·5000		1·444	9/64	2·646	**1 17 0**
560	2·6250		1·444	9/64	2·440	**1 17 0**
565 SERIES						
566	2·7500		1·444	9/64	2·700	**1 17 0**
566W	2·7500		1·444	9/64	2·668	**2 3 0**
567A	2·8125		1·444	9/64	2·575	**1 16 0**
567X	2·8750		1·444	3/16	2·460	**1 16 0**
NA569 Non-adjustable (see page 72)					3·088	**2 15 0**
570X	2·7559	70	1·444	3 m/m	2·678	**1 18 3**
575 SERIES						
575	3·0000		1·421	9/64	3·440	**1 18 6**
577	2·9375		1·421	9/64	3·578	**1 18 6**
578	3·1496	80	1·421	3 m/m	3·156	**1 18 6**
580	3·2500		1·421	9/64	2·972	**1 18 6**
595 SERIES						
593	3·5000		1·430	9/64	3·737	**1 18 9**
594	3·7500		1·430	9/64	3·157	**1 18 9**
596	3·3750		1·430	9/64	4·033	**1 18 9**
598X	3·6250		1·430	9/64	3·447	**1 16 9**
615 SERIES						
615	1·7500		1·625	9/64	3·440	**1 15 6**
619	2·0000		1·625	9/64	3·094	**1 15 6**
635 SERIES						
635	2·2500		1·625	9/64	4·270	**2 5 9**
639	2·5000		1·625	9/64	3·836	**2 5 9**
641	2·6250		1·625	9/64	3·583	**2 5 9**
643	2·7500		1·625	9/64	3·358	**2 5 9**
645	2·8125		1·625	1/4	3·220	**2 5 9**

CUPS *(Continued)*

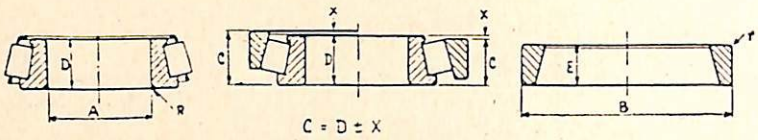
(In numerical sequence)



Cup No.	Cup O/D B ins.	Cup O/D B m/m	Length E ins.	Radius r ins.	Standout of Ass. Cone X ins.	Weight lb.	Price £ s. d.
472A	4·7244	120	·9230	2 m/m	·000	1·020	**1 2 6**
472B	Flanged cup	(see page 75)				1·182	**1 13 9**
472XS	4·8750		·9688	1/8	+ ·046	1·390	**1 2 6**
474	5·1181	130	1·2205	2 m/m	+ ·108	2·353	**1 7 9**
493	5·3750		·8750	1/8	+ ·016	1·245	**0 19 11**
493B	Flanged cup	(see page 75)				1·312	**1 15 0**
522	4·0000		1·0620	1/8	— ·045	·914	**1 1 6**
522B	Flanged cup	(see page 75)				1·021	**1 9 6**
532A	4·3750		1·1870	1/8	+ ·045	1·600	**1 2 3**
533A	4·3307	110	1·1870	1/8	+ ·041	1·534	**1 1 0**
533D	Double cup	(see page 72)				3·410	**2 11 0**
533US	4·0625		1·1875	1/16	+ ·045	1·530	**1 2 3**
552A	4·8750		1·1875	1/8	+ ·056	1·658	**1 7 3**
552D	Double cup	(see page 72)				3·489	**3 2 8**
552B	Flanged cup	(see page 75)				1·787	**1 18 0**
562X	5·1181	130	1·1417	3 m/m	+ ·012	1·765	**1 9 9**
563	5·0000		1·1250	1/8	— ·006	1·435	**1 9 3**
563D	Double cup	(see page 70 and 72)				3·380	**3 0 0**
563B	Flanged cup	(see page 75)				1·579	**2 1 0**
564DW	Double cup	(see page 70)				4·618	**5 3 6**
572	5·5118	140	1·1250	1/8	+ ·017	1·715	**1 10 0**
572B	Flanged cup	(see page 75)				1·876	**2 2 0**
572X	5·5000		1·1250	1/8	+ ·017	1·660	**1 10 0**
592A	6·0000		1·1875	1/8	+ ·133	2·321	**1 10 9**
592B	Flanged cup	(see page 75)				2·465	**2 2 6**
612	4·7500		1·2500	1/8	·000	1·890	**1 3 6**
632	5·3750		1·2500	1/8	·000	2·289	**1 10 6**

CONES (*Continued*)

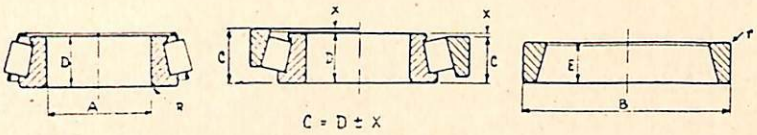
(In numerical sequence)



Cone No.	Bore A ins.	Bore A m/m	Length D ins.	Radius R ins.	Weight lb.	Price £ s. d.
655 SERIES						
655	2·7500		1·625	9/64	5·167	**2 16 0**
659	3·0000		1·625	9/64	4·654	**2 16 0**
663	3·2500		1·625	9/64	4·073	**2 16 0**
665	3·3750		1·625	9/64	3·782	**2 16 0**
675 SERIES						
683	3·7500		1·625	9/64	5·298	**2 19 0**
685	3·8750		1·625	9/64	4·990	**2 19 0**
687	4·0000		1·625	9/64	4·625	**2 19 0**
745 SERIES						
739X	3·0000		1·838	9/64	5·289	**2 12 0**
740	3·1875		1·838	13/64	4·893	**2 12 0**
740X	3·2500		1·838	9/64	4·700	**2 12 0**
749	3·3475		1·838	9/64	4·430	**2 12 0**
NA749 Non-	adjustable (see page 72)				4·939	**4 16 0**
755 SERIES						
755	3·0000		1·900	9/64	6·415	**3 0 1**
757	3·2500		1·900	9/64	5·829	**3 0 1**
759	3·5000		1·900	9/64	5·107	**3 0 1**
767X	3·5433	90	1·900	3 m/m	5·050	**3 0 1**
775 SERIES						
779	3·8750		1·875	9/64	6·980	**3 8 9**
780	4·0000		1·875	9/64	6·540	**3 4 9**
782	4·1250		1·875	9/64	6·190	**3 9 3**
NA782 Non-	adjustable (see page 72)				6·481	**6 6 0**
795 SERIES						
795	4·7500		1·875	1/8	9·730	**7 13 6**
835 SERIES						
837	3·0000		2·219	1/32	8·915	**4 1 0**
842	3·2500		2·219	9/64	8·070	**4 1 0**
855 SERIES						
855	3·5000		2·265	5/16	11·105	**4 11 9**
861	4·0000		2·265	5/16	9·153	**4 11 9**
NA861 Non-	adjustable (see page 72)				9·213	**11 3 0**
864	3·7500		2·265	5/16	10·201	**4 11 9**
866	3·8750		2·265	9/64	9·650	**4 11 9**
935 SERIES						
935	4·2500		2·625	17/32	13·408	**8 13 3**
938	4·5000		2·625	9/32	12·403	**8 13 3**
NA938 Non-	adjustable (see page 72)				12·750	**14 6 3**
941	4·0000		2·625	9/32	14·924	**8 13 3**
943	3·8750		2·625	9/64	15·540	**8 13 3**
945D	Double cone	(see page 71)			40·000	**26 12 0**
949XD	Double cone	(see page 71)			34·000	**26 12 0**
950X	4·3750		2·625	5/16	12·986	**8 13 3**
1100 SERIES						
1163X	·5625		·888	1/16	·235	**0 5 3**
1178X	·6250		·888	1/16	·222	**0 5 6**
1300 SERIES						
1351	·7500		·944	7/64	·354	**0 10 1**
1380	·8750		·794	1/16	·272	**0 10 1**
1600 SERIES						
1680	1·3125		·813	9/64	·404	**0 12 6**

CUPS *(Continued)*

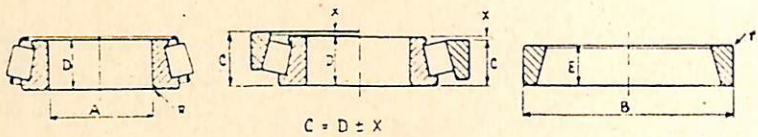
(In numerical sequence)



Cup No.	Cup O/D B ins.	m/m	Length E ins.	Radius r ins.	Standout of Ass. Cone X	Weight lb.	Price £ s. d.
652	6·0000		1·2500	1/8	·000	2·755	**1 18 4**
652B Fl	anged cup	(see p	age 75)			2·964	**3 0 0**
672	6·6250		1·1875	1/8	·000	2·700	**1 16 0**
672B Fl	anged cup	(see p	age 75)			2·947	**2 16 6**
742	5·9090		1·4375	1/8	— ·088	2·333	**1 13 0**
742D D	ouble cup	(see p	ages 70 an	d 72)		6·500	**7 1 0**
752	6·3750		1·5000	1/8	— ·025	3·523	**2 4 2**
752B Fl	anged cup	(see p	age 75)			3·806	**3 1 9**
772	7·1250		1·5000	1/8	·000	4·258	**2 17 6**
772B Fl	anged cup	(see p	age 75)			4·580	**4 6 3**
774D D	ouble cup	(see p	age 72)			9·731	**10 14 0**
792	8·1250		1·3750	1/8	·000	4·180	**6 17 6**
832	6·6250		1·6250	1/8	— ·094	3·810	**3 4 0**
854	7·5000		1·7500	1/8	— ·015	5·914	**4 4 3**
854D D	ouble cup	(see p	age 72)			13·857	**16 19 0**
932	8·3750		2·1250	1/8	·000	9·240	**4 6 9**
932D D	ouble cup	(see p	age 72)			21·890	**29 10 0**
1120NI	1·7500		·5625	1/16	— ·075	·102	**0 3 0**
1328	2·0625		·5625	1/16	— ·031	·148	**0 6 4**
1329	2·1250		·5625	1/16	— ·031	·179	**0 6 4**
1330	2·0000		·6250	1/16	— ·006	·130	**0 5 8**
1620	2·6250		·6250	1/16	·000	·280	**0 6 6**

CONES *(Continued)*

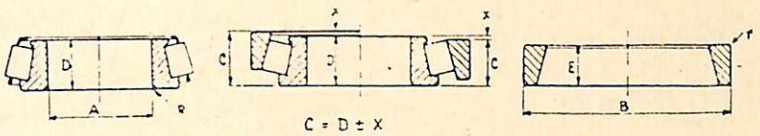
(In numerical sequence)



Cone No.	Bore A ins.	Bore A m/m	Length D ins.	Radius R ins.	Weight lb.	Price £ s. d.
1700 SERIES						
1760X	1·0000		·781	1/32	·280	0 12 1
1767X	·7502		·781	1/32	·353	0 12 1
1775	·7500		·781	1/16	·353	0 12 1
1779	·9375		·781	1/32	·301	0 12 1
1784A	·8434		·781	1/16	·325	0 12 1
1900 SERIES						
1985	1·1250		·762	1/32	·295	0 12 0
1988	·8750		·762	1/32	·384	0 12 3
1994X	1·0000		·762	9/64	·334	0 12 0
1997X	1·0625		·762	1/8	·315	0 12 0
A2000 SERIES						
A2037	·3750		·425	3/64	·072	0 6 3
A2047	·4720		·425	1/32	·060	0 6 3
2300 SERIES						
2381	·9375		·975	3/32	·434	0 11 9
2382	1·0000		·975	1/32	·412	0 11 9
2400 SERIES						
2473X	1·0000		·938	3/32	·630	0 14 0
2500 SERIES						
2561X	1·1895		·973	·08	·607	0 14 9
2578	1·1250		·973	3/32	·641	0 14 0
2580	1·2500		·973	1/32	·583	0 14 3
2581	1·3125		·973	1/32	·540	0 15 0
2600 SERIES						
2687	1·0000		·976	1/32	·578	0 13 0
2688	1·0625		·976	1/16	·549	0 13 0
2689	1·1250		·976	1/32	·523	0 13 0
2690	1·1562		·976	9/64	·500	0 13 0
2700 SERIES						
2774X	1·6250		1·010	9/64	·550	0 16 5
2785	1·3125		1·010	9/64	·753	0 14 5
2786	1·3750		1·010	13/64	·720	0 14 5
2788	1·5000		1·010	9/64	·640	0 14 5
2789	1·5625		1·010	9/64	·610	0 16 5
3100 SERIES						
3188	1·2500		1·181	1/16	·786	0 16 8
3189	1·0000		1·181	1/32	·934	0 16 8
3190	1·1811	30	1·181	9/64	·826	0 16 8
3191	1·1875		1·181	9/64	·820	0 16 8
3198	1·1250		1·181	1/32	·862	0 16 8
3300 SERIES						
3379	1·3750		1·197	9/64	1·089	0 18 9
3382	1·5625		1·197	9/64	·944	0 18 9
3383	1 6250		1·197	9/64	·896	0 18 9
3400 SERIES						
3476	1·2500		1·172	1/16	1·060	1 1 0
3477	1·3125		1·172	9/64	1·000	1 1 0
3478	1·3750		1·172	9/64	·944	1 1 0
3479X	1·4375		1·172	9/64	·915	1 2 6
3490	1·5000		1·172	9/64	·861	1 4 0

CUPS *(Continued)*

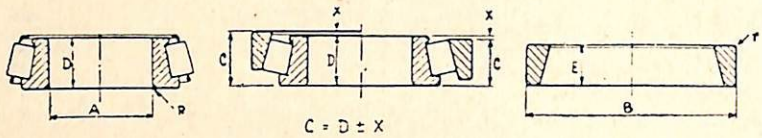
(In numerical sequence)



Cup No.	Cup O/D B ins.	m/m	Length E ins.	Radius r ins.	Standout of Ass. Cone X ins.	Weight lb.	Price £ s. d.
1729	2·2400		·6250	1/32	— ·018	·220	**0 7 2**
1730	2·1250		·6250	1/32	— ·018	·154	**0 6 5**
1738X	2·2500		·6910	3/32	+ ·015	·247	**0 7 11**
1920	2·2400		·6250	1/8	+ ·019	·160	**0 6 9**
1922	2·2500		·6250	1/16	+ ·019	·169	**0 6 9**
1931	2·3750		·6250	1/32	+ ·019	·250	**0 8 9**
1932	2·3125		·5940	3/64	— ·012	·195	**0 8 9**
A2126	1·2595		·3125	3/64	— ·031	·040	**0 5 0**
2320	2·2400		·8125	1/8	— ·037	·208	**0 7 9**
2420	2·6875		·6875	1/16	— ·062	·310	**0 9 0**
2520	2·6150		·8125	1/8	+ ·027	·273	**0 7 6**
2523	2·7500		·7500	1/16	— ·036	·368	**0 8 0**
2523B Flanged cup		(see page 75)				·400	**0 12 0**
2620	2·4843		·7500	1/8	— ·038	·245	**0 8 0**
2631	2·6150		·7500	1/32	— ·038	·360	**0 9 0**
2631B Flanged cup		(see page 75)				·389	**0 13 6**
2720	3·0000		·7500		— ·072	·405	**0 8 7**
2720B Flanged cup		(see page 75)				·490	**0 13 0**
3120	2·8593		·9375	1/8	+ ·006	·487	**0 9 4**
3120B Flanged cup		(see page 75)				·539	**0 14 0**
3120S	2·8346	72	·9375	1/8	+ ·006	·462	**0 9 4**
3129	3·0000		·9375	1/32	+ ·006	·670	**0 9 4**
3320	3·1562		·9375	1/8	— ·040	·470	**0 10 0**
3420	3·1250		·9375	1/8	— ·016	·567	**0 10 3**
3422	3·1562		·9375	1/8	— ·016	·605	**0 10 3**

CONES *(Continued)*

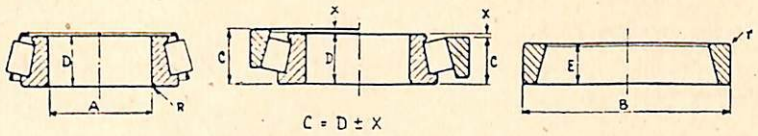
(In numerical sequence)



Cone No.	Bore A ins.	Bore A m/m	Length D ins.	Radius R ins.	Weight lb.	Price £ s. d.
3500 SERIES						
3577	1·6250		1·215	9/64	1·125	**1 3 3**
3578	1·7500		1·215	9/64	1·010	**1 3 3**
3579	1·6875		1·215	9/64	1·068	**1 3 3**
3580	1·5000		1·215	1/16	1·240	**1 3 3**
3582	1·5748	40	1·215	3·5 m/m	1·358	**1 3 3**
3583	1·5000		1·215	9/64	1·235	**1 3 3**
3700 SERIES						
3767	2·0625		1·193	3/32	1·122	**1 3 6**
3774	1·5625		1·193	9/64	1·602	**1 3 9**
3776	1·7710		1·193	9/64	1·422	**1 3 9**
3779	1·8750		1·193	9/64	1·280	**1 3 9**
3780	2·0000		1·193	9/64	1·192	**1 3 6**
NA3780 Two	row non-adjustable (see page 72)				1·231	**1 17 6**
3800 SERIES						
3876	1·5000		1·188	9/64	1·225	**1 0 0**
3877	1·6250		1·188	9/64	1·220	**1 0 0**
3900 SERIES						
3975	2·0000		1·183	9/64	2·227	**1 8 2**
3982	2·5000		1·183	9/64	1·648	**1 8 2**
3984	2·6250		1·183	9/64	1·471	**1 8 2**
3988X	2·3750		1·183	9/64	1·800	**1 8 2**
A4000 SERIES						
A4059	·5900		·433	1/32	·065	**0 8 7**
A6000 SERIES						
A6062	·6250		·439	3/64	·093	**0 8 3**
A6067	·6690		·439	1/32	·088	**0 5 9**
A6075	·7500		·439	1/32	·080	**0 8 3**
6200 SERIES						
6279	2·0000		2·062	9/64	4·560	**2 16 10**
6280	2·1250		2·062	9/64	4·325	**2 16 10**
6300 SERIES						
6359	2·2500		2·205	11/64	5·460	**2 11 11**
6379	2·5625		2·205	9/64	4·743	**3 1 9**
6400 SERIES						
6460	2·8750		2·135	9/64	5·876	**2 12 9**
9300 SERIES	STEEP ANGLE					
9378	3·0000		2·000	9/64	8·143	**5 18 0**
00000 SERIES						
00050	·5000		·550	1/16	·110	**0 4 4**
00068X	·4375		·713	1/32	·126	**0 4 0**
02400 SERIES						
02474	1·1250		·875	1/32	·540	**0 14 0**
02475	1·2500		·875	9/64	·470	**0 14 0**
02800 SERIES						
02872	1·1250		·875	1/32	·693	**0 15 3**
02875	1·2500		·875	9/64	·635	**0 15 3**
02877	1·3750		·875	9/64	·570	**0 15 3**
03000 SERIES						
03062	·6250		·578	3/64	·122	**0 6 4**
05000 SERIES						
05062	·6250		·562	1/16	·182	**0 7 3**
05075	·7500		·562	1/16	·160	**0 7 0**
05079	·7874	20	·562	1·5 m/m	·154	**0 7 0**

CUPS *(Continued)*

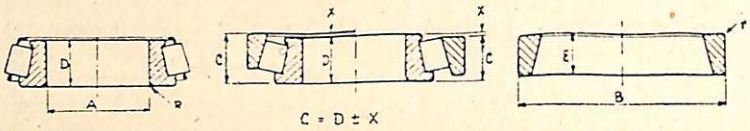
(In numerical sequence)



Cup No.	Cup O/D B ins.	m/m	Length E ins.	Radius r ins.	Standout of Ass. Cone X ins.	Weight lb.	Price £ s. d.
3520	3·3125		·9375	1/8	— ·028	·487	**0 10 9**
3525	3·4375		·9375	1/8	— ·028	·656	**0 12 9**
3525B	Flanged cup	(see page 75)				·719	**0 19 3**
3720	3·6718		·9375	1/8	— ·005	·636	**0 11 3**
3720B	Flanged cup	(see page 75)				·690	**0 17 0**
3729D	Double cup	(see page 72)				1·491	**1 7 6**
3820	3·3750		·9375	1/8	·000	·630	**0 10 9**
3920	4·4375		·9375	1/8	+ ·005	·990	**0 17 4**
3920B	Flanged cup	(see page 75)				1·060	**1 6 0**
A4138	1·3779	35	·3437	3/64	·000	·050	**0 5 0**
A6157	1·5748	40	·3750	3/64	+ ·033	·070	**0 4 9**
A6162	1·6250		·3438	3/64	+ ·030	·065	**0 4 9**
6220	5·0000		1·6250	1/8	— ·062	2·687	**1 8 2**
6320	5·3447		1·7500	1/8	— ·080	3·031	**1 12 6**
6420	5·8750		1·7500	1/8	— ·010	3·570	**2 2 0**
9320	7·0000		1·3750	1/8	+ ·188	4·902	**3 15 4**
00150	1·5000		·4375	1/32	— ·026	·080	**0 2 11**
00152X	1·4375		·4375	1/16	— ·026	·058	**0 2 6**
02420	2·6875		·6875	1/16	·000	·330	**0 9 0**
02820	2·8750		·6875	1/8	·000	·350	**0 7 9**
03162	1·6250		·4375	5/64	— ·015	·076	**0 4 0**
05185	1·8504	47	·4375	1·5 m/m	+ ·004	·102	**0 4 9**

CONES *(Continued)*

(In numerical sequence)



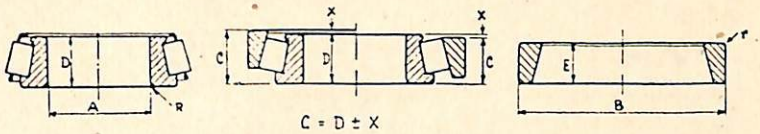
Cone No.	Bore A ins.	m/m	Length D ins.	Radius R ins.	Weight lb.	Price £ s. d.
07000 SERIES						
07098	·9842	25	·557	1·5 m/m	·176	**0 8 9**
07100	1·0000		·557	1/16	·173	**0 8 9**
08000 SERIES						
08125	1·2500		·594	·040	·228	**0 12 0**
09000 SERIES						
09062	·6250		·648	1/32	·275	**0 7 8**
†09067	·7500		·750	3/64	·240	**0 5 11**
09074	·7500		·848	1/16Ch	·239	**0 6 8**
09081S	·8115		·848	1/16Ch	·210	**0 6 8**
11000 SERIES						
11157	1·5748	40	·684	2 m/m	·479	**0 16 6**
11162	1·6250		·684	1/16	·450	**0 16 6**
14000 SERIES						
14118	1·1810		·756	1/32	·457	**0 10 0**
14125	1·2500		·771	9/64	·441	**0 10 0**
14132	1·3125		·771	9/64	·413	**0 10 0**
14138	1·3750		·771	9/64	·385	**0 10 0**
15000 SERIES						
15100S	1·0000		·813	3/64	·455	**0 10 6**
15112	1·1250		·813	9/64	·410	**0 10 6**
15118	1·1895		·813	9/64	·380	**0 10 6**
15119	1·1895		·813	·060	·380	**0 10 6**
15125	1·2500		·813	9/64	·357	**0 10 6**
15000R SERIES						
15100SR	1·0000		·750	3/64	·433	**0 10 3**
15112R	1·1250		·750	9/64	·390	**0 10 3**
15118R	1·1895		·750	9/64	·365	**0 10 3**
15124R	1·2500		·750	9/64	·340	**0 10 3**
16000 SERIES						
16150	1·5000		·813	9/64	·431	**0 12 5**
17000 SERIES						
17098	·9842	25	·652	1·5 m/m	·348	**0 12 6**
17118	1·1811	30	·652	1/16	·289	**0 12 6**
17119	1·1875		·652	1/16	·289	**0 12 6**
17500 SERIES						
17580	·6250		·656	1/16	·156	**0 7 4**
19000 SERIES						
19138	1·3779	35	·650	2 m/m	·400	**0 13 6**
19143	1·4375		·650	1/16	·378	**0 13 6**
19150	1·5000		·650	1/16	·349	**0 13 6**
21000 SERIES	STEEP ANGLE					
21075	·7500		·860	1/16	·323	**0 13 3**
NA21075	Two row non-adjustable (see page 73)				·340	**1 0 0**
23000 SERIES	STEEP ANGLE					
23092	·9375		·845	1/16	·473	**0 14 6**
23100	1·0000		·845	1/16	·455	**0 14 6**
24700 SERIES						
24780	1·6250		·906	9/64	·610	**0 15 0**

† Where this cone is used with any cup in the 09000 Series add + ·027 to X dimension.

19268/19150 Y6/46

CUPS (*Continued*)

(In numerical sequence)

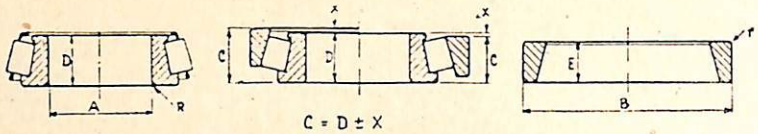


Cup No.	Cup O/D B ins.	m/m	Length E ins.	Radius r ins.	Standout of Ass. Cone X ins.	Weight lb.	Price £ s. d.
07196	1·9687		·3750	1 m/m	— ·026	·075	**0 5 6**
07204	2·0473	52	·5000	5/64	+ ·034	·134	**0 5 6**
07210X	2·0000		·5000	1/16	+ ·034	·114	**0 5 6**
08231	2·3125		·4219	·040	— ·016	·131	**0 6 9**
09194	1·9380		·6875	9/64	+ ·058	·182	**0 3 4**
09194S	2·0820		·5781	1/8	— ·051	·215	**0 4 4**
09195	1·9380		·5625	3/64	— ·067	·143	**0 3 4**
09196	1·9380		·6875	1/16	+ ·058	·186	**0 2 10**
11300	3·0000		·5625	1/16	+ ·025	·370	**0 8 0**
11315	3·1496	80	·5625	2 m/m	+ ·025	·393	**0 8 0**
†14274	2·7170		·6250	1/8	+ ·010	·280	**0 5 0**
†14274S	2·9650		·6250	1/8	+ ·010	·480	**0 5 8**
†14276	2·7170		·6250	1/32	+ ·010	·295	**0 5 0**
†14283	2·8380		·7250	3/32	+ ·110	·430	**0 6 6**
15250	2·5000		·625	1/6	·000	·244	**0 6 0**
15251D	Double cup (see page 70)					·600	**0 13 9**
15245R	2·4410		·5625	3/64	— ·315	·186	**0 5 9**
15250R	2·5000		·5625	3/64	— ·315	·220	**0 5 9**
16284	2·8440		·6250	1/32	·000	·319	**0 7 9**
17244	2·4410	62	·5625	1/16	— ·022	·199	**0 7 0**
17520	1·6875		·5310	1/16	·000	·109	**0 3 8**
19268	2·6875		·4688	·060	— ·025	·161	**0 7 6**
19283	2·8346	72	·5625	2 m/m	+ ·019	·290	**0 7 6**
21212	2·1250		·6250	3/32	+ ·015	·211	**0 7 3**
21226D	Double cup (see pages 70 and 73)					·710	**0 17 0**
23256	2·5625		·6250	1/16	+ ·030	·310	**0 8 0**
24721	3·0000		·8125	3/32	+ ·094	·440	**0 11 8**

† When used with Cone 14118, add + ·015 in. to X dimension.

CONES *(Continued)*

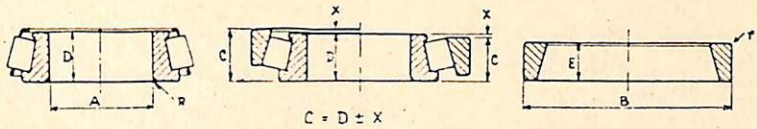
(In numerical sequence)



Cone No.	Bore A ins.	Bore A m/m	Length D ins.	Radius R ins.	Weight lb.	Price £ s. d.
25500 SERIES						
25578	1·6875		1·000	·090	·780	**0 17 0**
25580	1·7500		1·000	9/64	·657	**0 17 0**
25800 SERIES						
25877	1·3750		·969	1/16	·770	**0 14 5**
26000 SERIES						
26112	1·1250		·745	1/16	·499	**0 14 3**
26118	1·1811	30	·745	2 m/m	·476	**0 14 3**
NA26118	Two-row non-adjustable (see page 72)				·503	**1 2 0**
26126	1·2598	32	·745	2 m/m	·442	**0 14 3**
26131	1·3125		·745	9/64	·415	**0 14 3**
27800 SERIES						
27880	Single cone for Two-row bearing (see page 70)				·810	**0 18 0**
28000 SERIES						
28137	1·3750		·824	1/16	·660	**0 17 3**
28150	1·5000		·824	1/16	·570	**0 17 3**
28158	1·5748	40	·824	1/16	·523	**0 17 3**
31500 SERIES						
31590	1·3125		1·125	1/32	·857	**0 17 6**
31593	1·3750		1·125	9/64	·820	**0 17 6**
33000 SERIES						
33262	2·6250		1·188	9/64	1·908	**1 9 3**
33275	2·7500		1·188	9/64	1·725	**1 9 3**
33281	2·8125		1·188	9/64	1·697	**1 9 3**
34000 SERIES						
34300	3·0000		·906	·080	·560	**1 1 0**
35000 SERIES						
35175	1·7500		·906	9/64	·705	**0 18 9**
36000 SERIES						
36137	1·3750		1·175	1/16	·840	**0 17 6**
39000 SERIES						
39235X	2·3622	60	·866	2·5 m/m	1·186	**1 8 0**
39236	2·3616		·866	3/32	1·160	**1 8 0**
39250	2·5000		·866	·080	1·070	**1 8 0**
41000 SERIES	STEEP ANGLE					
41100	1·0000		·955	3/32	·694	**1 0 0**
41125	1·1250		·955	3/32	·614	**1 0 0**
43000 SERIES	STEEP ANGLE					
43125	1·2500		·948	1/16	·777	**1 0 6**
43131	1·3125		·948	9/64	·743	**1 0 6**
44000 SERIES	STEEP ANGLE					
44150	1·5000		·933	3/32	·990	**0 19 0**
44156	1·5625		·933	3/32	·950	**0 19 0**
NA44156	Two-row non-adjustable (see page 73)				1·007	**1 2 3**
44157X	1·5748	40	·808	3/32	·924	**0 19 0**
44162	1·6250		·933	3/32	·912	**0 19 0**
NA44163	Two-row non-adjustable (see page 73)				·959	**1 2 3**
49000 SERIES						
49150	1·5000		1·250	9/64	1·560	**1 1 9**
49162	1·6250		1·250	9/64	1·460	**1 1 9**
49175	1·7500		1·250	9/64	1·330	**1 1 9**

CUPS *(Continued)*

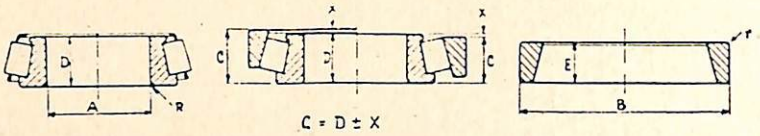
(In numerical sequence)



Cup No.	Cup O/D B ins.	m/m	Length E ins.	Radius r ins.	Standout of Ass. Cone X ins.	Weight lb.	Price £ s. d.
25520	3·2650		·7500	1/32	— ·062	·420	**0 11 3**
25522	3·2700		·7525	·080	— ·060	·450	**0 12 3**
25820	2·8750		·7500	3/32	— ·031	·375	**0 8 7**
26274	2·7450		·7500	1/16	+ ·005	·317	**0 7 9**
26283	2·8346	72	·6250	2 m/m	+ ·003	·350	**0 7 9**
26283B	Flanged cup (see page 75)					·380	**0 11 9**
26284D	Double cup (see page 72)					·833	**0 17 6**
26300	3·0000		·6250	1/16	+ ·003	·489	**0 9 6**
27820D	Double cup (see page 70)					1·070	**1 6 0**
28300	3·0000		·6100	1/16	— ·012	·300	**0 8 3**
28315	3·1496	80	·6250	2 m/m	+ ·003	·426	**0 8 3**
28315B	Flanged cup (see page 75)					·470	**0 19 0**
28317	3·1510		·6250	1/16	+ ·019	·445	**0 8 3**
28318D	Double cup (see page 70)					·990	**1 1 6**
31520	3·0000		·9375	1/8	+ ·031	·518	**0 10 0**
33462	4·6250		·9375	1/8	·000	·960	**1 1 6**
33472	4·7244	120	·9230	1/32	— ·015	1·250	**1 6 7**
34478	4·7812		·6875	·080	+ ·063	·620	**0 17 6**
35326	3·2650		·6875	1/32	— ·031	·350	**0 9 6**
36300	3·0000		·9375	1/8	— ·019	·518	**0 10 0**
39412	4·1250		·6250	·080	— ·022	·400	**0 17 9**
39433	4·3330		·6786	3/32	·000	·690	**0 17 9**
39434X	4·3307	110	·6786	2·5 m/m	·000	·695	**0 17 9**
41286	2·8593		·6875	1/16	+ ·014	·390	**0 8 0**
43312	3·1250		·6875	1/16	+ ·052	·482	**0 10 3**
44348	3·4843		·6875	1/16	+ ·067	·539	**0 12 0**
44348D	Double cup (see page 73)					1·200	**1 18 0**
44363D	Double cup (see pages 70 and 73)					1·560	**2 2 6**
49368	3·6875		1·000	1/8	·000	·810	**0 13 8**

CONES *(Continued)*

(In numerical sequence)

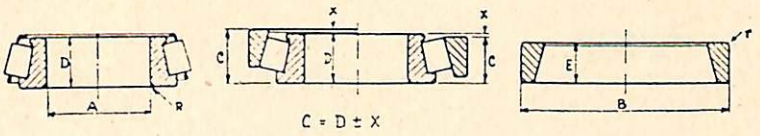


Cone No.	Bore A ins.	m/m	Length D ins.	Radius R ins.	Weight lb.	Price £ s. d.
52000 SERIES						
52387	3·8750		1·422	9/64	3·620	**3 10 10**
52400	4·0000		1·422	9/64	3·570	**3 10 10**
53000 SERIES	STEEP ANGLE					
53162	1·6250		1·114	1/16	1·281	**1 1 0**
53176X	1·7500		1·114	9/64	1·182	**1 1 0**
NA53176	Two-row non-adjustable (see page 73)				1·248	**1 6 6**
55000 SERIES	STEEP ANGLE					
55200	2·0000		1·059	9/64	1·667	**1 14 0**
NA55200	Two-row non-adjustable (see page 73)				1·760	**1 15 6**
55206	2·0625		1·059	9/64	1·562	**1 14 0**
59000 SERIES						
59175	1·7500		1·438	9/64	2·260	**1 9 10**
64000 SERIES						
64450	4·5000		1·625	9/64	5·070	**5 0 0**
69000 SERIES						
69354	3·5430		1·188	3/32	3·430	**2 18 6**
71000 SERIES						
71425	4·2500		1·938	9/64	8·240	**6 0 3**
71437	4·3750		1·938	9/64	7·800	**6 0 3**
71450	4·5000		1·938	9/64	7·470	**6 0 3**
NA71450	Two-row non-adjustable (see page 72)				7·620	**8 10 0**
72000 SERIES	STEEP ANGLE					
72200X	2·0000		1·291	9/64	2·489	**2 13 4**
72212	2·1250		1·291	9/64	2·332	**2 13 4**
NA72212	Two-row non-adjustable (see page 73)				2·521	**2 17 0**
74000 SERIES						
74500	5·0000		1·875	9/64	10·964	**8 3 6**
78000 SERIES	STEEP ANGLE					
78216D	Double Cone	(see page 71)			7·050	**3 15 0**
78250	2·5000		1·309	3/32	3·228	**3 9 9**
78251D	Double Cone	(see page 71)			6·137	**3 15 0**
81000 SERIES						
81600X	6·0000		1·969	9/64	11·420	**14 19 4**
81601D	Double cone	(see pages 71 and 74)			20·000	*
82000 SERIES						
82550	5·5000		2·230	9/64	13·862	**13 18 6**
82576	5·7500		2·230	9/64	13·420	**13 18 6**
82587	5·8750		2·230	9/64	12·610	**13 18 6**
82600 SERIES						
82680D	Double cone	(see page 74)			37·000	*
88000 SERIES						
88900	9·0000		1·938	1/4	17·000	*
88925	9·2500		1·938	1/4	15·000	*
93000 SERIES						
93750	7·5000		2·500	11/64	30·230	**26 15 0**
93800	8·0000		2·500	11/64	25·870	**25 10 0**
NA93800	Two-row non-adjustable (see page 72)				28·000	**29 16 6**
93801D	Double cone	(see page 74)			52·000	*

*For price apply to British Timken Ltd.

CUPS *(Continued)*

(In numerical sequence)

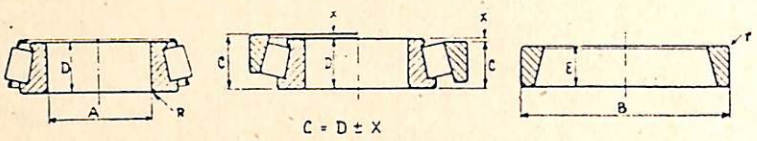


Cup No.	Cup O/D B ins.	m/m	Length E ins.	Radius r ins.	Standout of Ass. Cone X ins.	Weight lbs.	Price £ s. d.
52618	6·1875		1·0313	1/8	+ ·016	1·550	**1 15 5**
52637	6·3750		1·0313	1/8	+ ·016	2·080	**1 15 5**
52637B	Flanged cup (see page 75)					2·250	**2 9 6**
53362X	3·6250		·8125	3/32	+ ·105	·628	**0 14 10**
53375	3·7500		·8125	1/32	+ ·105	·807	**0 14 0**
53387	3·8750		·8125	1/16	+ ·105	·976	**0 15 0**
53390D	Double cup (see pages 70 and 73)					1·960	**2 4 0**
55437	4·3750		·8125	1/8	+ ·129	1·130	**0 18 6**
55443	4·4375		·8125	1/8	+ ·129	1·260	**0 19 0**
55444D	Double cup (see pages 70 and 73)					2·570	**2 6 6**
59412	4·1250		1·1250	1/8	·000	1·042	**1 0 0**
64700	7·0000		1·1875	1/8	·000	2·440	**2 10 0**
69630	6·3030		·8780	1/8	— ·001	1·780	**1 15 9**
71750	7·5000		1·3750	1/8	— ·063	3·800	**4 14 5**
71751D	Double cup (see page 72)					9·000	**10 17 3**
72487	4·8750		1·0000	1/8	+ ·147	1·730	**1 10 2**
72488D	Double cup (see page 73)					4·000	**3 2 6**
74850	8·5000		1·3750	1/8	·000	4·284	**6 10 6**
74850B	Flanged cup (see page 75)					4·643	**8 5 0**
78551	5·5130		·9260	3/32	+ ·129	2·030	**1 9 0**
81962	9·6250		1·3125	1/8	— ·094	5·150	**9 10 0**
81962X	9·6250		1·6250	1/8	— ·094	5·150	**9 10 0**
81963D	Double cup (see page 74)					12·000	*
82950	9·5000		1·7500	1/8	+ ·020	8·099	**7 0 0**
82950B	Flanged cup (see page 75)					9·190	**12 10 0**
82620	Single cup for Four-Row bearing (see page 74)					10·000	*
82620D	Double cup (see page 74)					23·000	*
88128	12·8750		1·3750	1/8	+ ·125	9·500	*
93125	12·5000		1·8125	1/8	·000	13·191	**19 10 0**
93127D	Double cup (see page 72 and 74)					33·000	**45 0 0**

*For price apply to British Timken Ltd.

CONES (*Continued*)

(In numerical sequence)

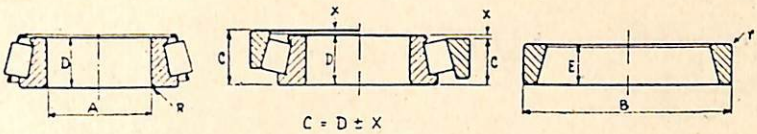


Cone No.	Bore A ins.	m/m	Length D ins.	Radius R ins.	Weight lb.	Price £ s. d.
94000 SERIES						
94631X	6·3125		2·500	9/32	26·970	**24 10 0**
94650	6·5000		2·500	9/32	25·770	**24 10 0**
94700	7·0000		2·500	9/32	22·110	**23 10 0**
NA94700	Two-row non-adjustable (see page 72)				24·000	**27 1 0**
95000 SERIES						
95462XSD	Double Cone (see page 71)				41·600	*
95475	4·7500		2·500	1/4	17·960	**13 16 0**
95500	5·0000		2·500	1/4	16·680	**13 16 0**
NA95500	Two-row non-adjustable (see page 72)				18·000	**14 17 6**
95525	5·2500		2·500	3/8	15·070	**13 16 0**
97000 SERIES	STEEP ANGLE					
97450	4·5000		1·946	9/64	13·050	**12 15 0**
NA97450	Two-row non-adjustable (see page 73)				14·000	**14 1 0**
97500	5·0000		1·946	9/64	11·110	**12 15 0**
98000 SERIES	STEEP ANGLE					
98316	3·1496	80	1·938	9/64	12·420	
98335	3·3465	85	1·938	9/64	11·750	
98350	3·5000		1·938	9/64	11·620	
NA98350	Two-row non-adjustable (see page 73)				12·187	
98400	4·0000		1·938	9/64	9·810	
99000 SERIES						
99550	5·5000		2·625	9/32	21·080	
99575	5·7500		2·625	9/32	19·440	
99587	5·8750		2·625	9/32	18·640	
99600	6·0000		2·625	9/32	17·810	
NA99600	Two-row non-adjustable (see page 72)				18·000	
115000 SERIES						
115092	9·2500		4·063	1/4	105·000	
115097	9·7500			1/4	26·500	
116000 SERIES						
116047X	4·7500		2·500	5/16	48·000	
116048D	Double cone (see page 71)				48·000	
116050	5·0000		2·500	1/8	18·000	
117000 SERIES	STEEP ANGLE					*
117062	6·2992		3·125	1/4	60·400	
117063	6·3750	160	3·125	1/4	59·000	
126000 SERIES						
126096D	Double cone (see page 74)				87·000	
129000 SERIES						
129120X	Single cone for two-row bearing (see page 70)				48·800	
129121D	Double cone (see page 71)				87·000	
129123D	Double cone (see page 71)				87·000	
130000 SERIES						
130787	7·8750		2·750	17/64	47·000	
130851	8·5000		2·750	17/64	41·000	
130901D	Double cone (see page 71)				63·000	
130902	9·0000		2·750	17/64	35·000	
NA130902	Two-row non-adjustable (see page 72)				35·000	
133000 SERIES						
133136D	Double cone (see pages 71 and 74)				74·000	
HM144100 SERIES						
HM144145D	Double cone (see pages 71 and 74)				68·000	

*For prices apply to British Timken Ltd.

CUPS *(Continued)*

(In numerical sequence)

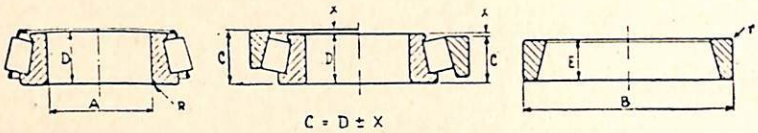


Cup No.	Cup O/D B ins.	m/m	Length E ins.	Radius r ins.	Standout of Ass. Cone X ins.	Weight lb	Price £ s. d.
94113	11·3750		1·8750	1/8	·000	11·783	**17 2 6**
94113B	Flanged cup (see page 75)					12·753	**21 10 0**
94114D	Double cup (see page 72)					20·000	**40 15 0**
95925	9·2500		1·9375	1/8	·000	8·895	**7 9 6**
95927D	Double cup (see page 72)					22·000	**15 10 6**
97900	9·0000		1·500	1/8	+ ·179	7·475	**11 1 6**
97901D	Double cup (see page 73)					18·000	**25 9 6**
98788	7·8740	00	1·375	1/8	+ ·141	5·050	
98789D	Double cup see page 73)					12·200	
99100	10·0000		1·875	1/8	·000	9·286	
99100B	Flanged cup (see page 75)					10·099	
99101X	Double cup (see page 70)					24·000	
99101D	Double cup (see page 72)					24·000	
115175	17·5000		3·000	3/16	+ ·062	48·000	
115175D	Double cup (see page 70)					108·000	
116097	9·7500		1·8750	3/16	·000	10·000	
116098	9·8750		1·8750	3/16	·000	11·000	
117148	14·7500		2·3750	1/8	+ ·313	33·000	*
126150	Single cup for four-row bearing see page 74)					25·000	
126151XD	Double cup (see page 74)					54·000	
129172	17·2460		2·1250	3/16	— ·031	25·000	
129173	Double cup (see page 70)					59·000	
131400	14·0000		1·9375	1/16	·000	16·000	
131401D	Double cup (see pages 70 and 72)					38·000	
133180	Single cup for two-row bearing (see page 71)					19·000	
133181	Double cup (see page 74)					43·000	
HM144112	Single cup for two-row bearing (see page 71)					24·000	
HM144112D	Double cup (see page 74)					50·000	

*For prices apply to British Timken Ltd.

CONES *(Continued)*

(In numerical sequence)



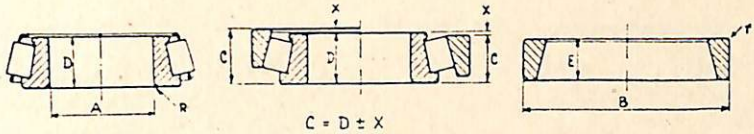
C = D ± X

Cone No.	Bore A ins.	m/m	Length D ins.	Radius R ins.	Weight lb.	Price £ s. d.
HH144600 SERIES						
HH144642	7·8750		4·500	1/4	87·00	
153000 SERIES						
153048D	Double cone	(see page 71)			58·00	
153049	4·8750		3·250	3/8	29·00	
153050	5·0000		3·250	3/8	28·00	
170000 SERIES						
170950	9·5000		2·000	1/4	27·00	
170951	Double cone	(see page 71)			51·00	
175000 SERIES						
175300	30·0000		2·750	1/8	93·00	
192000 SERIES						
192150	15·0000		2·312	1/4	45·00	
195000 SERIES	STEEP ANGLE					
195500X	5·0000		2·651	3/16	32·00	
197000 SERIES	STEEP ANGLE					
197045	4·5000		2·937	1/8	24·00	
204000 SERIES						
204140D	Double cone	(see pages 71 and 74)			97·00	
215000 SERIES	STEEP ANGLE					
215040	4·0000		2·875	1/4	23·00	
217000 SERIES						
217056	5·7500		2·875	1/4	28·00	*
217057XD	Double cone	(see page 71)			56·00	
217062X	6·2500		2·875	17/32	24·00	
220000 SERIES						
221026	10·2500		2·656	3/8	42·00	
NA221026	Two-row non-adjustable (see page 72)				43·00	
221028D	Double cone	(see pages 71 and 74)			76·00	
224000 SERIES						
224115	11·5000		4·250	1/4	134·00	
250000 SERIES						
251001	10·0000		2·188	1/8	36·00	
270000 SERIES						
270526D	Double cone	(see page 71)			34·50	
270537XS	5·3750		3·386	Ch.	32·50	
270538XD	Double cone	(see page 71)			65·40	
275000 SERIES						
275109D	Double cone	(see page 74)			84·00	
277000 SERIES						
277455	45·5000		4·750	1/4	630·00	
280000 SERIES						
280700D	Double cone	(see pages 71 and 74)			48·00	
280702	7·0000		2·721	1/4	27·00	
295000 SERIES						
NA291201	Two-row non-adjustable (see page 72)				47·00	
295950X	9·5000		4·938	1/4	175·00	

*For prices apply to British Timken Ltd.

CUPS *(Continued)*

(In numerical sequence)

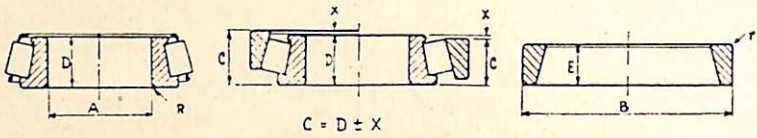


Cup No.	Cup O/D B ins.	m/m	Length E ins.	Rad. r ins.	Standout of Ass. Cone X ins.	Weight lb.	Price £ s. d.
HH144614	15·5000		3·5000	1/4	—·125	47·00	
153101	10·1875		2·25	1/4	—·188	16·00	
171436	14·3720		1·3125	1/8	·000	12·00	
171450	14·9606		1·3125	1/8	·000	13·00	
171451D	Double cup (see page 70)					35·00	
175350	35·0000		2·0000	1/8	·000	52·00	
192200	20·0000		1·5000	1/8	+·188	21·00	
195116X	11·6250		2·0000	3/16	+·599	23·00	
197100	10·0000		1·9375	1/4	+·125	15·00	
204190	Single cup for two-row bearing (see pages 71 and 74)					25·00	
204191D	Double cup (see page 74)					54·00	
215098	9·8750		2·0000	1/4	+·125	16·00	
217112	11·2500		2·1875	1/4	+·125	16·00	*
221575	15·7500		1·8125	1/4	+·094	20·00	
221576XD	Double cup (see page 70)					45·00	
221576D	Double cup (see pages 70, 72 and 74)					47·00	
224204	20·5000		3·0000	1/4	·000	68·00	
251575	15·7500		1·6250	1/16	+·062	20·00	
271102S	11·0236	280	2·4375	1/4	—·136	19·30	
275155	Single cup for four-row bearing (see page 74)					16·00	
275156XD	Double cup (see page 74)					34·00	
277565	56·5000		3·7500	1/4	·000	320·00	
281200	12·0000		1·6875	1/8	—·096	11·00	
281201D	Double cup (see pages 70 and 74)					27·00	
291751D	Double cup (see page 72)					49·00	
295193	19·2500		3·6250	1/4	—·188	68·00	

*For prices apply to British Timken Ltd.

CONES *(Continued)*

(In numerical sequence)

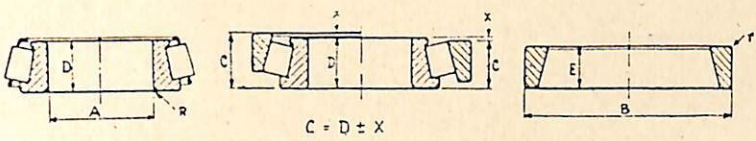


Cone No.	Bore A ins.	Bore A m/m	Length D ins.	Radius R ins.	Weight lb.	Price £ s. d.
328000 SERIES						
328167	16·7500		5·622	1/2	285·00	
328172D	Double cone	(see page 71)			500·00	
420000 SERIES						
420751	7·5000		3·500	1/4	64·00	
420801	8·0000		3·500	1/8	52·00	
420812X	8·1250		3·500	1/4	50·30	
424000 SERIES						
424257X	Double cone	(see pages 71 and 74)			1,310·00	
428000 SERIES						
428262D	Double cone	(see page 74)			1,680·00	
430000 SERIES						
430900	9·0000		3·438	13/32	63·00	
433000 SERIES						
433301X	Double cone	(see pages 71 and 74)			2,895·00	
450000 SERIES						
450551	5·5000		3·688	3/8	45·00	
450601	6·0000		3·688	3/8	40·00	
450601X	6·0000		3·688	Bevel	45·00	
470000 SERIES						
470078X	7·0000		3·625	3/8	48·00	
516000 SERIES						
516050	5·0000		3·250	1/4	42·00	*
526000 SERIES						
526131D	Double cone	(see page 74)			114·00	
526132	13·0000		3·1560	1/8	64·00	
528000 SERIES						
528301D	Double cone	(see page 74)			2,735·00	
540000 SERIES						
540502	5·0000		3·4375	17/32	40·00	
540550	5·5000		3·4375	3/8	36·00	
550000 SERIES						
551002	10·0000		3·140	17/64	60·00	
551026	10·2500		3·140	17/64	57·00	
551050	10·5000		3·140	17/64	53·00	
560000 SERIES						
560600	6·0000		3·000	11/16	40·00	
580000 SERIES						
580575X	5·7500		3·125	1/2	31·00	
580575XS	5·7500		3·125	1/2	31·00	
590000 SERIES						
590675	6·7500		3·188	1/4	43·00	
626000 SERIES						
626209X	Double cone	(see page 74)			609·00	
670000 SERIES						
671798D	Double cone	(see page 74)			500·00	

*For prices apply to British Timken Ltd.

CUPS *(Continued)*

(In numerical sequence)

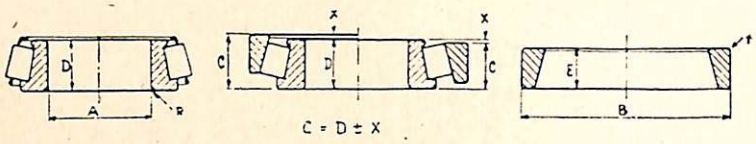


Cup No.	Cup O/D B ins.	m/m	Length E ins.	Radius r ins.	Standout of Ass. Cone X ins.	Weight lb.	Price £ s. d.
328268D	Double cup (see page 70)					335·00	
328269	26·9960		4·1250	1/4	+ ·003	143·00	
421417	14·1732	360	2·500	1/8	+ ·125	25·00	
421450	14·5000		2·5000	1/8	+ ·125	33·00	
421451D	Double cup (see page 70)					70·00	
424405	Single cup for two-row bearing (see pages 71 and					315·00	
424406	Double cup (see pages 70 and 74)					635·00	
428420	Single cup for two-row bearing (see pages 71 and					585·00	
428421	Double cup (see page 74)					800·00	
431575	15·7500		2·5000	1/8	+ ·062	35·00	
431576D	Double cup (see page 70)					76·00	
433512	Single cup for four-row bearing (see pages 69 and					505·00	
433513	Double cup (see page 74)					1,100·00	
451212	12·1250		2·4375	17/64	— ·188	23·00	
470132	13·2500		2·5000	1/4	— ·062	25·00	
516122	12·2500		2·2500	1/4	+ ·250	26·00	*
526190	19·0000		2·3750	1/8	+ ·218	33·00	
526191	Double cup (see page 70)					73·00	
526191X	Double cup (see page 74)					71·00	
528480	Single cup for four-row bearing (see page 74)					595·00	
528481	Double cup (see page 74)					1,260·00	
541162	11·6250		2·250	1/4	— ·188	20·00	
551662	16·6250		2·625	1/8	+ ·250	33·00	
551663	Double cup (see page 70)					71·00	
551701	Double cup (see page 70)					77·00	
561275	12·7500		2·125	3/16	+ ·062	23·00	
581176S	11·7500		2·1875	1/4	·000	17·00	
591326	13·2500		2·1250	1/4	— ·063	22·00	
626318X	Double cup (see page 74)					290·00	
626319X	Single cup for four-row bearing (see page 74)					122·00	
672873	Single cup for four-row bearing (see page 74)					112·00	
672875XD	Double cup (see page 74)					245·00	

*For prices apply to British Timken Ltd.

CONES *(Continued)*

(In numerical sequence)

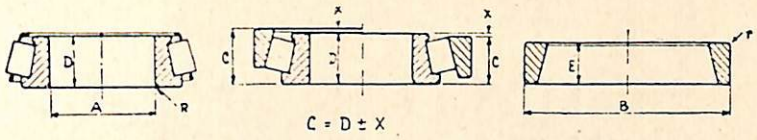


Cone No.	Bore A ins.	Bore A m/m	Length D ins.	Radius R ins.	Weight lb.	Price £ s. d.
673000 SERIES						
673067X	6·8125		3·500	3/8	52·50	*
673070X	7·0000		3·500	9/64	50·00	
715000 SERIES						
715210X	Double cone	(see page 71)			2,360·00	
722000 SERIES						
722110	11·0000		3·6875	3/8	91·00	
722115	11·5000		3·6875	3/8	90·00	
750000 SERIES						
750558	5·5000		2·4375	1/8	29·00	
822000 SERIES						
822100X	10·0000		3·000	1/4	70·00	
822101D	Double cone	(see page 71)			132·00	
833000 SERIES						
833158X	15·7500		4·2500	3/8	159·00	
833160X	16·0000		4·2500	3/8	151·00	
833161X	Double cone	(see pages 71 and 74)			279·00	
940000 SERIES						
941205X	12·0000		3·0656	1/4	83·80	
980000 SERIES						
982051	20·5000		3·2190	1/4	163·00	

*For prices apply to British Timken Ltd.

CUPS *(Continued)*

(In numerical sequence)

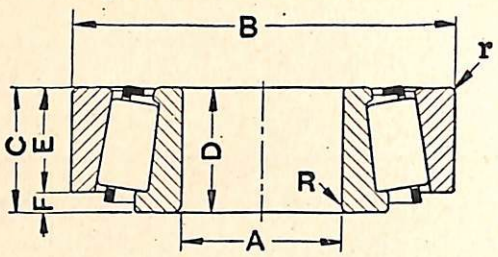


Cup No.	Cup O/D B ins.	m/m	Length E ins.	Radius r ins.	Standout of Ass. Cone X ins.	Weight lb.	Price £ s. d.
673136	13·6250		2·5	1/4	·000	27·25	*
715380	Single cup for two-row bearing (see page 71)					580·00	
722186D	Double cup (see page 70)					95·00	
751200	12·0000		1·625	1/4	—·062	15·00	
822175	17·5000		2·0000	1/4	·000	30·00	
822176	Double cup (see page 70)					69·00	
833232	23·2500		3·1875	1/4	—	58·00	
833233	Double cup (see pages 70 and 74)					132·00	
941950	19·5000		2·1250	1/8	—·066	33·00	
941953	Double cup (see page 70)					75·00	
982901	Double cup (see page 70)					137·00	

*For prices apply to British Timken Ltd.

SINGLE ROW BEARINGS—TYPE S

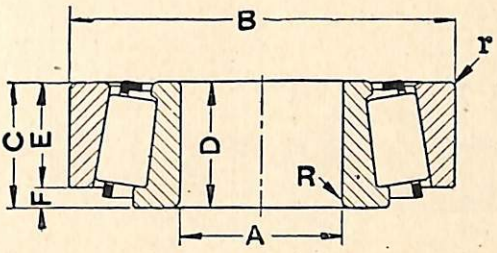
Arranged in order of bore diameter.



Bore A ins.	Bore A m/m	Cone No.	Cup O Diameters available ins.	m/m	ins.	m/m	ins.	m/m	ins.	m/m	For full Dimensions see page No.
·3750		**A2037**	1·2595								44-45
·4375		**00068X**	1·4375		1·500						46-47
·4720		**A2047**	1·2595								44-45
·5000		**00050**	1·4375		1·500						46-47
·5625		**1163X**	1·7500								42-43
·5900		**A4059**	1·3779	35							46-47
·6250		**A6062**	1·6250		1·5748*	40					46-47
·6250		**03062**	1·6250								46-47
·6250		**05062**	1·8504	47							46-47
·6250		**1178X**	1·7500								42-43
·6250		**09062**	1·9380		2·0820						48-49
·6250		**17580**	1·6875								48-49
·6690		**A6067**	1·5748	40	1·6250						46-47
·7500		**A6075**	1·6250		1·5748	40					46-47
·7500		**05075**	1·8504	47							46-47
·7500		**09067**	1·9380		2·0820						48-49
·7500		**09074**	1·9380		2·0820						48-49
·7500		**1351**	2·0625		2·1250		2·0000				42-43
·7500		**1775**	2·2400		2·1250		2·2500				44-45
·7502		**1767X**	2·2400		2·1250		2·2500				44-45
·7874	20	**05079**	1·8504	47							46-47
·7874	20	**157**	2·0473	52							38-39
·8115		**09081S**	1·9380		2·0820						48-49
·8119		**248X**	2·5000		2·4409	62	2·4375				38-39
·8434		**1784A**	2·2400		2·1250		2·2500				44-45
·8750		**1380**	2·0625		2·1250		2·0000				42-43
·8750		**1988**	2·2500		2·3125		2·3750		2·2400		44-45
·9375		**1779**	2·2400		2·1250		2·2500				44-45
·9375		**2381**	2·2400								44-45
·9842	25	**07098**	2·0000		2·0473	52	1·9687				48-49
·9842	25	**247**	2·4410	62	2·5000		2·4375				38-39
·9842	25	**17098**	2·4410	62							48-49
1·0000		**07100**			2·0000		2·0473	52	1·9687		48-49
1·0000		**1994X**	2·2500		2·3125		2·3750		2·2400		44-45
1·0000		**2687**	2·6150		2·4843						44-45
1·0000		**2473X**	2·6875								44-45
1·0000		**0247**	2·5000		2·4409	62	2·4375				38-39
1·0000		**1760X**	2·2400		2·1250		2·2500				44-45
1·0000		**2382**	2·2400								44-45
1·0000		**15100S**	2·5000								48-49
1·0000		**15100SR**	2·4410		2·5000						48-49
1·0000		**3189**	2·8593		2·8346	72	3·0000				44-45
1·0625		**2688**	2·6150		2·4843						44-45
1·0625		**1997X**	2·2400		2·2500		2·3750		2·3125		44-45
1·1250		**1985**	2·2500		2·2400		2·3750		2·3125		44-45
1·1250		**15112**	2·5000								48-49
1·1250		**15112R**	2·4410		2·5000						48-49
1·1250		**2689**	2·6150		2·4843						44-45
1·1250		**26112**	2·7450		2·8346	72	3·0000				50-51
1·1250		**2578**	2·7500		2·6150						44-45
1·1250		**3198**	2·8593		3·0000		2·8346	72			44-45

SINGLE ROW BEARINGS—TYPE S *(Continued)*

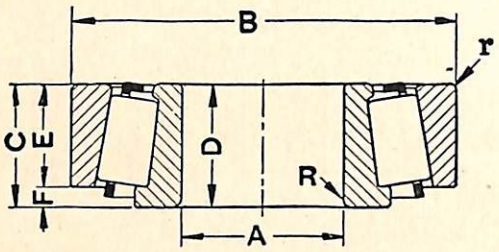
Arranged in order of bore diameter.



Bore A		Cone No.	Cup O Diameters available								For full Dimensions see page No.
ins.	m/m		ins.	m/m	ins.	m/m	ins.	m/m	ins.	m/m	
1·1250		**02474**	2·6875								46-47
1·1250		**02872**	2·8750								46-47
1·1562		**2690**	2·6150		2·4843						44-45
1·1810		**14118**	2·7170		2·8380		2·7170		2·9650		48-49
1·1811	30	**17118**	2·4410	62							48-49
1·1811	30	**26118**	2·7450		2·8346	72	3·0000				50-51
1·1811	30	**3190**	2·8593		2·8346	72	3·0000				44-45
1·1811	30	**3191**	2·8593		3·0000		2·8346	72			44-45
1·1875		**17119**	2·4410	62							48-49
1·1895		**15118**	2·5000								48-49
1·1895		**15118R**	2·4410		2·5000						48-49
1·1895		**15119**	2·5000								48-49
1·1895		**2561X**	2·6150		2·7500						44-45
1·2500		**08125**	2·3125								48-49
1·2500		**02475**	2·6875								46-47
1·2500		**15125**	2·5000								48-49
1·2500		**15124R**	2·4410		2·5000						48-49
1·2500		**14125**	2·7170		2·8380		2·7170		2·9650		48-49
1·2500		**2580**	2·7500		2·6150						44-45
1·2500		**3188**	2·8593		3·0000		2·8346	72			44-45
1·2500		**02875**	2·8750								46-47
1·2500		**3476**	3·1250		3·1562						44-45
1·2598	32	**26126**	2·7450		2·8346	72	3·0000				50-51
1·3125		**1680**	2·6250								42-43
1·3125		**14132**	2·7170		2·8380		2·7170		2·9650		48-49
1·3125		**26131**	2·7450		2·8346	72	3·0000				50-51
1·3125		**2581**	2·7500		2·6150						44-45
1·3125		**2785**	3·0000								44-45
1·3125		**31590**	3·0000								50-51
1·3125		**3477**	3·1250		3·1562						44-45
1·3750		**14138**	2·7170		2·8380		2·7170		2·9650		48-49
1·3750		**25877**	2·8750								50-51
1·3750		**28137**	3·0000		3·1496	80	3·1510				50-51
1·3750		**2786**	3·0000								44-45
1·3750		**31593**	3·0000								50-51
1·3750		**36137**	3·0000								50-51
1·3750		**3478**	3·1250		3·1562						44-45
1·3750		**335**	3·1496	80	3·1562		3·3750				38-39
1·3750		**3379**	3·1562								44-45
1·3750		**02877**	2·8750								46-47
1·3779	35	**19138**	2·6875				2·8346	72			48-49
1·4375		**19143**	2·6875				2·8346	72			48-49
1·4375		**3479X**	3·1250		3·1562						44-45
1·5000		**19150**	2·6875				2·8346	72			48-49
1·5000		**16150**	2·8440								48-49
1·5000		**28150**	3·0000		3·1496	80	3·1510				50-51
1·5000		**2788**	3·0000								44-45
1·5000		**337**	3·1496	80	3·1562		3·3750				38-39
1·5000		**3490**	3·1250		3·1562						44-45

SINGLE ROW BEARINGS—TYPE S *(Continued)*

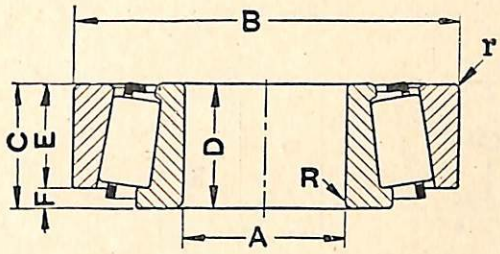
Arranged in order of bore diameter.



Bore A		Cone No.	Cup O Diameters available								For full Dimensions see page No.
ins.	m/m		ins.	m/m	ins.	m/m	ins.	m/m	ins.	m/m	
1·5000		**3580**	3·4375		3·3125						46-47
1·5000		**3583**	3·4375		3·3125						46-47
1·5000		**418**	3·4843		3·5433	90					38-39
1·5000		**49150**	3·6875								50-51
1·5000		**444**	3·7500								38-39
1·5000		**337S**	3·3750		3·1496	80	3·1562				38-39
1·5000		**3876**	3·3750								46-47
1·5000		**27880**	(see page 70)								50-51
1·5625		**422**	3·4843		3·5433	90					38-39
1·5625		**3774**	3·6718								46-47
1·5625		**2789**	3·0000								44-45
1·5625		**3382**	3·1562								44-45
1·5748	40	**28158**	3·0000		3·1496	80	3·1510				50-51
1·5748	40	**11157**	3·0000		3·1496	80					48-49
1·5748	40	**344**	3·3750		3·1496	80	3·1562				38-39
1·5748	40	**350**	3·5480		3·5433	90	3·3465	85			38-39
1·5748	40	**3582**	3·3125		3·4375						46-47
1·6250		**11162**	3·0000		3·1496	80					48-49
1·6250		**3577**	3·4375		3·3125						46-47
1·6250		**419**	3·4843		3·5433	90					38-39
1·6250		**49162**	3·6875								50-51
1·6250		**447**	3·7500								38-39
1·6250		**526**	4·0000								40-41
1·6250		**342**	3·3750		3·1496	80	3·1562				38-39
1·6250		**2774X**	3·0000								44-45
1·6250		**3383**	3·1562								44-45
1·6250		**3877**	3·3750								46-47
1·6250		**24780**	3·0000								48-49
1·6875		**25578**	3·2650		3·2700						50-51
1·6875		**3579**	3·4375		3·3125						46-47
1·7500		**25580**	3·2650		3·2700						50-51
1·7500		**35175**	3·2650								50-51
1·7500		**3578**	3·4375		3·3125						46-47
1·7500		**49175**	3·6875								50-51
1·7500		**438**	3·7500								38-39
1·7500		**527**	4·0000								40-41
1·7500		**59175**	4·1250								52-53
1·7500		**460**	4·1250		4·2500		4·3307	110			38-39
1·7500		**535**	4·0625		4·3307	110	4·3750				40-41
1·7500		**615**	4·7500								40-41
1·7500		**355X**	3·5480		3·5433	90	3·3465	85			38-39
1·7710		**3776**	3·6718								46-47
1·7717	45	**358**	3·3465	85	3·5433	90	3·5480				38-39
1·7717	45	**376**	3·8125								38-39
1·8125		**359S**	3·3465	85	3·5433	90	3·5480				38-39
1·8125		**436**	3·7500								38-39
1·8750		**369S**	3·5000		3·5433	90					38-39

SINGLE ROW BEARINGS—TYPE S *(Continued)*

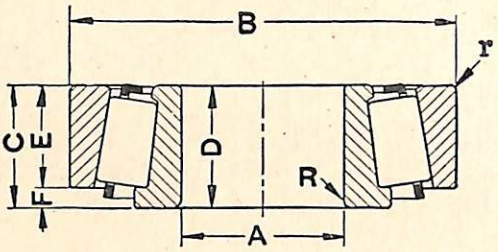
Arranged in order of bore diameter.



Bore A		Cone No.	Cup O Diameters available								For full Dimensions see page No.
ins.	m/m		ins.	m/m	ins.	m/m	ins.	m/m	ins.	m/m	
1·8750		**3779**	3·6718								46-47
1·8750		**463**	4·1250		4·2500		4·3307	110			38-39
1·8750		**536**	4·0625		4·3307	110	4·3750				40-41
1·9685	50	**365**	3·5433	90	3·5000		Flanged Cup				38-39
2·0000		**3780**	3·6718								46-47
2·0000		**375**	3·8125								40-41
2·0000		**529X**	4·0000								38-39
2·0000		**455**	4·1250		4·2500		4·3307	110			40-41
2·0000		**537**	4·0625		4·3307	110	4·3750				
2·0000		**3975**	4·4375								
2·0000		**619**	4·7500								40-41
2·0000		**368A**	3·5433	90	3·5000						38-39
2·0000		**6279**	5·0000								46-47
2·0625		**3767**	3·6718								46-47
2·0625		**377**	3·8125		3·9370						38-39
2·1250		**456**	4·1250		4·2500		4·3307	110			38-39
2·1250		**539**	4·0625		4·3307	110	4·3750				40-41
2·1250		**6280**	5·0000								46-47
2·1650		**538US**	4·3750		4·3307	110	4·0625				40-41
2·1654	55	**385**	3·8750		3·8125		3·9370	100			38-39
					Flanged Cup						
2·1654	55	**538**	4·3750		4·3307	110	4·0625				40-41
2·2500		**387**	3·8750		3·9370	100					38-39
2·2500		**462**	4·1250		4·2500		4·3307	110			38-39
2·2500		**555S**	4·8750								40-41
2·2500		**635**	5·375								40-41
2·2500		**6359**	5·3447								46-47
2·3616		**39236**	4·1250		4·3330		4·3307	110			50-51
2·3622	60	**476**	4·7244	120	5·1181	130	4·8750				40-41
2·3622	60	**39235X**	4·1250		4·3330		4·3307	110			50-51
2·3750		**558**	4·8750								40-41
2·3750		**3988X**	4·4375								46-47
2·5000		**39250**	4·1250		4·3330		4·3307	110			50-51
2·5000		**395**	4·3307	110							38-39
2·5000		**3982**	4·4375								46-47
2·5000		**477**	4·7244	120	5·1181	130	4·8750				40-41
2·5000		**559**	4·8750								40-41
2·5000		**639**	5·3750								40-41
2·5591	65	**478**	4·7244	120	5·1181	130	4·8750				40-41
2·5591	65	**LY73**	5·5118	140	5·5960						38-39

SINGLE ROW BEARINGS—TYPE S *(Continued)*

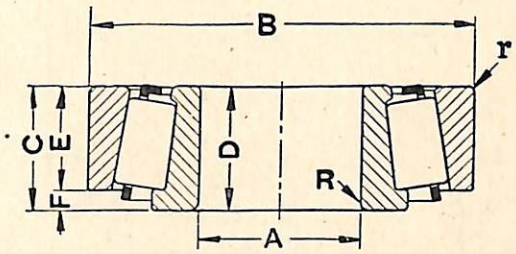
Arranged in order of bore diameter.



Bore A		Cone No.	Cup O Diameters available								For full Dimensions see page No.
ins.	m/m		ins.	m/m	ins.	m/m	ins.	m/m	ins.	m/m	
2·5625		**6379**	5·3447								46-47
2·6250		**395S**	4·3307	110							38-39
2·6250		**3984**	4·4375								46-47
2·6250		**33262**	4·6250		4·7244	120					50-51
2·6250		**478S**	4·7244	120	5·1181	130	4·8750				40-41
2·6250		**560**	4·8750								40-41
2·6250		**641**	5·3750								40-41
2·6250		**LY77**	5·5118	140	5·5960						38-39
2·6875		**480**	4·7244	120	5·1181	130	4·8750				40-41
2·7500		**482**	4·7244	120	5·1181	130	4·8750				40-41
2·7500		**566**	5·0000		5·1181	130					40-41
2·7500		**566W**	5·0000		5·1181	130					40-41
2·7500		**643**	5·3750								40-41
2·7500		**655**	6·0000								42-43
2·7500		**33275**	4·6250		4·7244	120					50-51
2·7559	70	**570X**	5·0000		5·1181	130					40-41
2·7559	70	**484**	4·7244	120	4·8750		5·1181	130			40-41
2·8125		**33281**	4·6250		4·7244	120					50-51
2·8125		**567A**	5·0000		5·1181	130					40-41
2·8125		**645**	5·3750								40-41
2·8750		**567X**	5·1181	130	5·0000						40-41
2·8750		**LY72**	5·5960		5·5118	140					38-39
2·8750		**6460**	5·8750								46-47
2·9375		**577**	5·5118	140	5·5000						40-41
3·0000		**34300**	4·7812								50-51
3·0000		**LY70**	5·5118	140	5·5960						38-39
3·0000		**575**	5·5118	140	5·5000						40-41
3·0000		**739X**	5·9090								42-43
3·0000		**659**	6·0000								42-43
3·0000		**755**	6·3750								42-43
3·0000		**837**	6·6250								42-43
3·1250		**LY79**	5·5118	140	5·5960						38-39
3·1496	80	**578**	5·5118	140	5·5000						40-41
3·1875		**496**	5·3750								40-41
3·1875		**740**			5·9090						42-43
3·2500		**495**	5·3750								40-41
3·2500		**580**	5·5118	140	5·5000						40-41
3·2500		**740X**	5·9090								42-43
3·2500		**663**	6·0000								42-43
3·2500		**757**	6·3750								42-43
3·2500		**842**	6·6250								42-43
3·3125		**498**	5·3750								40-41
3·3465	85	**98335**	7·8740	200							54-55
3·3475		**749**			5·9090						42-43
3·3750		**596**	6·0000								40-41
3·3750		**665**	6·0000								42-43
3·5000		**593**	6·0000								40-41
3·5000		**759**	6·3750								42-43

SINGLE ROW BEARINGS—TYPE S *(Continued)*

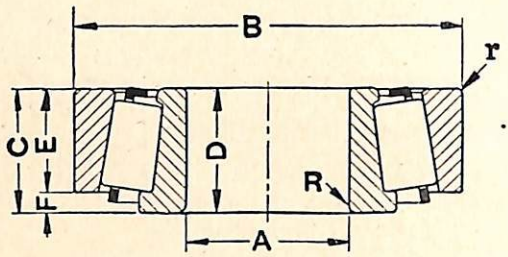
Arranged in order of bore diameter.



Bore A		Cone No.	Cup O Diameters available								For full Dimensions see page No.
ins.	m/m		ins.	m/m	ins.	m/m	ins.	m/m	ins.	m/m	
3·5000		**855**	7·5000								42-43
3·5430		**69354**	6·3030								52-53
3·5433	90	**767X**	6·3750								42-43
3·6250		**598X**	6·0000								40-41
3·7500		**594**	6·0000								40-41
3·7500		**683**	6·6250								42-43
3·7500		**864**	7·5000								42-43
3·8750		**685**	6·6250								42-43
3·8750		**779**	7·1250								42-43
3·8750		**866**	7·5000								42-43
3·8750		**943**	8·3750								42-43
3·8750		**52387**	6·1875		6·3750						52-53
4·0000		**52400**	6·1875		6·3750						52-53
4·0000		**687**	6·6250								42-43
4·0000		**780**	7·1250								42-43
4·0000		**861**	7·5000								42-43
4·0000		**941**	8·3750								42-43
4·1250		**782**	7·1250								42-43
4·2500		**71425**	7·5000								52-53
4·2500		**935**	8·3750								42-43
4·3750		**71437**	7·5000								52-53
4·3750		**950X**	8·3750								42-43
4·5000		**71450**	7·5000								52-53
4·5000		**938**	8·3750								42-43
4·5000		**64450**	7·0000								52-53
4·7500		**795**	8·1250								42-43
4·7500		**95475**	9·2500								54-55
4·7500		**116047X**	9·7500		3·8750						54-55
4·8750		**153049**	10·1875								56-57
5·0000		**74500**	8·5000								52-53
5·0000		**95500**	9·2500								54-55
5·0000		**153050**	10·1875								56-57
5·0000		**540502**	11·6250								58-59
5·0000		**116050**	9·7500		9·8750						54-55
5·0000		**516050**	12·2500								58-59
5·2500		**95525**	9·2500								54-55
5·3750		**270537XS**	11·0236	280							56-57
5·5000		**82550**	9·5000								52-53
5·5000		**99550**	10·0000								54-55
5·5000		**450551**	12·1250								58-59
5·5000		**540550**	11·6250								58-59
5·5000		**750558**	12·0000								60-61
5·7500		**82576**	9·5000								52-53

SINGLE ROW BEARINGS—TYPE S *(Continued)*

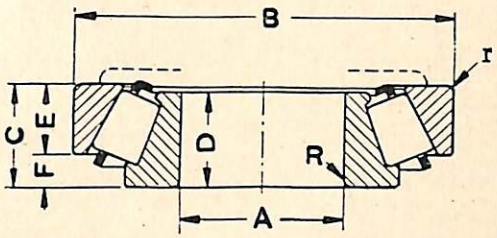
Arranged in order of bore diameter.



Bore A ins.	Bore A m/m	Cone No.	Cup O Diameters Available ins.	m/m	ins.	m/m	ins.	m/m	ins.	m/m	For full Dimensions see page No.
5·7500		**99575**	10·0000								54-55
5·7500		**217056**	11·2500								56-57
5·7500		**580575X**	11·7500								58-59
5·7500		**580575XS**	11·7500								58-59
5·8750		**82587**	9·5000								52-53
5·8750		**99587**	10·0000								54-55
6·0000		**81500X**	9·6250		9·6250						52-53
6·0000		**99600**	10·0000								54-55
6·0000		**450601**	12·1250								58-59
6·0000		**560600**	12·7500								58-59
6·0000		**450601X**	12·1250								58-59
6·2500		**217062X**	11·2500								56-57
6·3125		**94631X**	11·3750								54-55
6·5000		**94650**	11·3750								54-55
6·7500		**590675**	13·2500								58-59
6·8125		**673067X**	13·6250								60-61
7·0000		**94700**	11·3750								54-55
7·0000		**280702**	12·0000								56-57
7·0000		**470078X**	13·2500								58-59
7·0000		**673070X**	13·6250								60-61
7·5000		**93750**	12·5000								52-53
7·5000		**420751**	14·1732	360	14·5000						58-59
7·8750		**HH144642**			15·5000						56-57
7·8750		**130787**	14·0000								54-55
8·0000		**93800**	12·5000								52-52
8·0000		**420801**	14·1732	360	14·5000						58-59
8·1250		**420812X**	14·1732	360	14·5000						58-59
8·5000		**130851**	14·0000								54-55
9·0000		**88900**	12·8750								52-53
9·0000		**130902**	14·0000								54-55
9·0000		**430900**	15·7500								58-59
9·2500		**88925**	12·8750								52-53
9·2500		**115092**	17·5000								54-55
9·5000		**295950X**	19·2500								56-57
9·5000		**170950**	14·9606		14·3720						56-57
9·7500		**115097**	17·5000								54-55
10·0000		**251001**	15·7500								56-57
10·0000		**551002**	16·6250								58-59
10·0000		**822100X**	17·5000								60-61
10·2500		**221026**	15·7500								56-57
10·2500		**551026**	16·6250								58-59
10·5000		**551050**	16·6250								58-59
11·5000		**224115**	20·5000								56-57
12·0000		**941205X**	19·5000								60-61
13·0000		**526132**	19·0000								58-59
15·0000		**192150**	20·0000								56-57
15·7500		**833158X**	23·2500								60-61
16·7500		**328167**	26·9960								58-59
30·0000		**175300**	35·0000								56-57
45·5000		**277455**	56·500								56-57

SINGLE ROW BEARINGS—STEEP ANGLE—TYPE SS

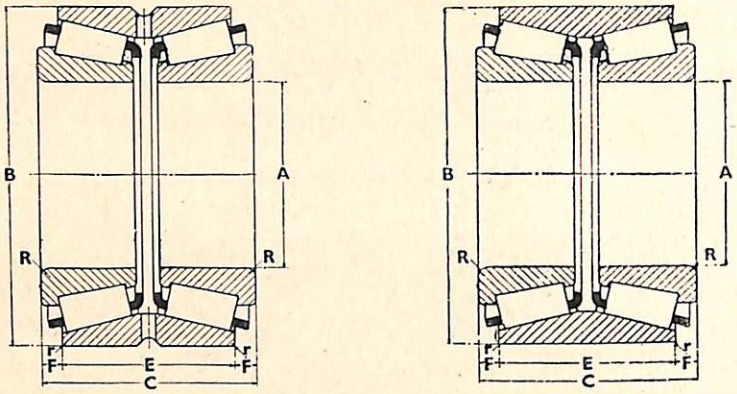
Arranged according to cone bore



Bore A		Cone No.	Cup O Diameters available								For full Dimensions see page No.
ins.	m/m		ins.	m/m	ins.	m/m	ins.	m/m	ins.	m/m	
·7500		**21075**	2·1250								48-49
·9375		**23092**	2·5625								48-49
1·0000		**23100**	2·5625								48-49
1·0000		**41100**	2·8593								50-51
1·1250		**41125**	2·8593								50-51
1·2500		**43125**	3·1250								50-51
1·3125		**43131**	3·1250								50-51
1·5000		**44150**	3·4843								50-51
1·5625		**44156**	3·4843								50-51
1·5748		**44157X**	3·4843								50-51
1·6250		**44162**	3·4843								50-51
1·6250		**53162**	3·6250		3·7500		3·8750				52-53
1·7500		**53176X**	3·6250		3·7500		3·8750				52-53
2·0000		**55200**	4·3750								52-53
2·0000		**72200X**	4·8750								52-53
2·0625		**55206**	4·3750		4·4375						52-53
2·1250		**72212**	4·8750								52-53
2·5000		**78250**	5·5130								52-53
3·0000		**9378**	7·0000								46-47
3·1496	80	**98316**	7·8740	200							54-55
3·3465	85	**98335**	7·8740	200							54-55
3·5000		**98350**	7·8740	200							54-55
4·0000		**98400**	7·8740								54-55
4·0000		**215040**	9·8750								56-57
4·5000		**197045**	10·0000								56-57
4·5000		**97450**	9·0000								54-55
5·0000		**97500**	9·0000								54-55
5·0000		**195500X**	11·6250								56-57
6·2992	160	**117062**	14·7500								54-55
6·3750		**117063**	14·7500								54-55

TWO ROW BEARINGS—TYPE DO

Double Cup, Single Cone.

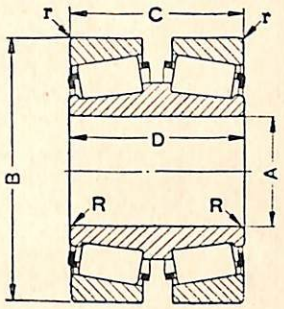


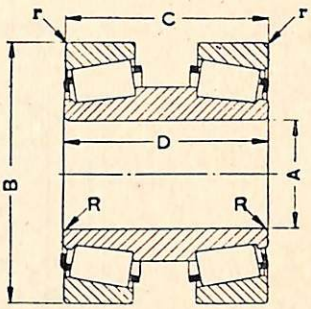
A	B	C	E	F	R	r	Bearing Cone	No. Cup
·7500	2·2500	1·9375	1·4375	·2500	1/16	1/32 Oil holes	21075	21226D
1·5000	3·1510	1·8125	1·3750	·2188	1/16	1/32 ,,	28150	28318D
1·5000	3·1510	2·2500	1·7700	·2400	·032	·025 ,,	27880	27820D
1·5000	3·6250	2·1875	1·5625	·3125	3/12	1/16 ,,	44150	44363D
1·7500	3·8750	2·5625	1·7500	·4063	9/64	1/16 ,,	53176X	53390D
1·1895	2·5000	1·3125	1·4375	·1875	1/16	1/32 ,,	15119	15251D
2·0000	4·4375	2·5625	1·8125	·3750	9/64	1/16 ,,	55200	55444D
2·1250	4·5000	2·6250	2·1875	·2188	9/64	1/32 ,,	456	453DW*
2·1654	3·9370	1·9375	1·5625	·1875	2 m/m	1/32 ,,	385	384ED
2·7500	5·0000	3·1875	2·5265	·3125	9/64	1/16 ,,	566	563D
2·7500	5·2500	3·1875	2·5625	·3125	9/64	1/32 ,,	566W	564DW*
3·0000	6·1250	4·0000	3·3750	·3125	9/64	1/16 ,,	739X	742D
6·0000	10·0000	6·0000	4·5000	·7500	9/32	1/16 ,,	99600	99101X
7·0000	12·0000	5·8204	3·8750	·9727	1/4	1/16 —	280702	281201D
7·8750	14·0000	6·0000	4·3750	·8125	17/64	1/16 Oil holes	130787	131401D
8·0000	14·500	7·6250	5·3750	1·1250	1/8	1/16 ,,	420801	421451D
9·0000	15·7500	7·3750	5·3750	1·0000	13/32	1/16 ,,	430900	431576D
9·2500	17·5000	9·0000	6·7500	1·1250	1/4	1/16 ,,	115092	115175D
9·5000	14·5000	4·7500	3·3750	·6875	1/4	1/16 ,,	170950	171451D
10·0000	17·5000	6·5000	4·5000	1·0000	1/4	1/16 ,,	822100X	822176D
10·2500	15·7500	6·1250	4·2500	·9375	3/8	1/16 ,,	221026	221576XD
10·2500	15·7500	6·1250	4·2500	·9375	3/8	1/16 ,,	221026	221576D
10·2500	16·6250	7·0312	5·5000	·7656	17/64	1/16 ,,	551026	551663D
10·2500	16·9970	6·8125	5·0625	·8750	17/64	1/16 ,,	551026	551701D
11·0000	18·5000	7·8750	5·8750	1·0000	3/8	1/16 ,,	722110	722186D
12·0000	17·2460	6·5000	4·7500	·8750	1/4	1/16 ,,	129120X	129173D
12·0000	19·5000	6·6376	5·0000	·8188	1/4	1/16 ,,	941205X	941953D
13·0000	19·0000	7·0000	5·0000	1·0000	1/8	1/16 ,,	526132	526191D
16·0000	23·2500	9·0000	6·8750	1·0625	3/8	1/16 ,,	833160X	833233D
16·7500	26·9960	12·2500	9·2500	1·5000	1/2	1/8 ,,	328167	328268D
20·5000	29·0000	7·3426	4·5000	1·4213	1/4	1/16 ,,	982051	982901D
25·5000	40·5000	12·2500	9·7500	1·2500	1/4	1/8 —	424255X	424406D

* Slotted

TWO ROW BEARINGS—TYPE DI

Double Cone, Single Cups (arranged in order of Bore diameter)

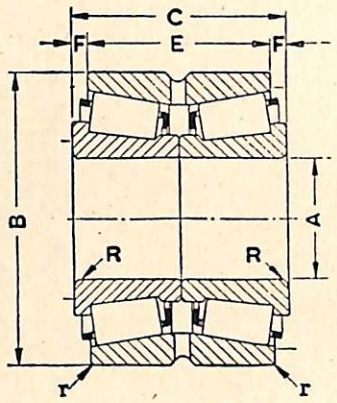




Bore A	B	C	D	R	r	Bearing No. Cone	Cup
2·1650	5·5130	2·6020	2·5980	3/32	3/32	78216D	78551
2·5000	5·5130	2·6020	2·5980	3/32	3/32	78251D	78551
3·8750	8·0750	5·6250	6·0000	13/32	1/8	949XD	932
4·0000	8·3750	5·6250	6·0000	13/32	1/8	945D	932
4·6250	9·2500	5·5000	6·0000	Special	1/8	95462XSD	95925
4·6250	9·7500	6·0000	6·3750	5/16	3/16	116048D	116097
4·8750	10·1875	6·3750	6·7500	Special	1/4	153048D	153101
5·2500	11·0236	6·3750	6·7500	7/16	1/4	270526D	271102S
5·3750	11·0236	6·3750	6·7500	7/16	1/4	270538XD	271102S
5·7500	11·2500	6·0000	5·7500	3/16	1/4	217057XD	217112
6·0000	9·6250	3·4375	3·6250	1/16	1/8	81601D	81962
7·0000	12·0000	4·3086	4·5000	1/8	1/8	280700D	281200
7·8740	14·9606	5·1875	5·1875	1/4	1/4	HM144145D	HM144112
9·0000	14·0000	4·7500	4·7500	7/32	1/16	130901D	131400
9·5000	14·3720	3·6500	3·6490	1/16	1/8	170951D	171436
10·0000	17·5000	5·2500	5·2500	1/8	1/4	822101D	822175
10·2500	15·7500	4·6875	4·7500	1/16	1/4	221028D	221575
11·9940	17·2460	5·2500	5·3125	1/8	3/16	129121D	129172
12·0080	17·2460	5·2500	5·3125	1/8	3/16	129123D	129172
13·5060	17·9960	4·7500	4·7500	1/16	1/8	133136D	133180
14·0000	19·0000	5·1875	5·0000	1/16	1/8	204140D	204190
16·0000	23·2500	7·6250	7·6250	1/8	1/4	833161X	833232
17·0040	26·9960	10·0000	9·9950	1/4	1/4	328172D	328269
21·0000	38·0000	19·5000	19·5000	1/4	1/2	715210X	715380
25·5000	40·5000	11·0000	10·7500	1/4	1/4	424257X	424405
26·0000	42·0000	12·6562	12·2812	1/4	1/4	428262D	428420
30·0000	51·0000	12·2500	12·25	1/4	1/4	433101X	433512

TWO ROW BEARINGS—TYPE NA

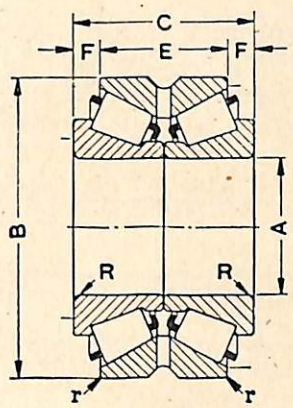
Non-Adjustable—Double Cup, Single Cones



Bore A	B	C	E	F	R	r	Cone	Cup
1·1805	2·8338	1·6875	1·4375	·1250	1/16	1/32	NA26118	26284D
1·5748	3·5480	2·0000	1·7500	·1250	1/16	1/32	NA357	353D
1·7500	3·7500	2·4375	2·0000	·2188	9/64	1/32	NA438	432D
2·0000	3·6718	2·5625	2·0625	·2500	9/64	1/32	NA3780	3729D
2·0000	4·2500	2·5625	2·1250	·2188	9/64	1/32	NA455	452D
2·1250	4·3750	3·1250	2·5000	·3125	9/64	1/16	NA539	533D
2·3750	4·8750	3·1250	2·5000	·3125	9/64	1/16	NA558	552D
2·6250	5·0000	3·1875	2·5625	·3125	9/64	1/16	NA569	563D
3·2500	6·1250	4·0000	3·3750	·3125	9/64	1/16	NA749	742D
4·0000	7·5000	5·0000	4·0000	5000	9/64	1/16	NA861	854D
4·1250	7·1250	4·1250	3·3750	·3750	9/64	1/16	NA762	774D
4·5000	8·3750	5·6250	4·6250	·5000	9/64	1/16	NA938	932D
4·5000	7·5000	4·1875	3·1875	·5000	9/64	1/16	NA71450	71751D
5·0000	9·2500	5·6250	4·5000	·5625	9/64	1/16	NA95500	95927D
6·0000	10·0000	5·6380	4·2750	·6315	9/64	1/16	NA99600	99101D
7·0000	11·3750	5·6250	4·3750	·6250	7/32	1/16	NA94700	94114D
8·0000	12·5000	5·7500	4·3750	·6875	7/32	1/16	NA93800	93127D
9·0000	14·0000	5·7500	4·3750	·6875	1/4	1/16	NA130902	131401D
10·2500	15·7500	5·7500	4·2500	·7500	1/4	1/16	NA221026	221576XD
12·0000	17·5000	5·5000	3·8750	·8125	1/4	1/16	NA291201	291751D

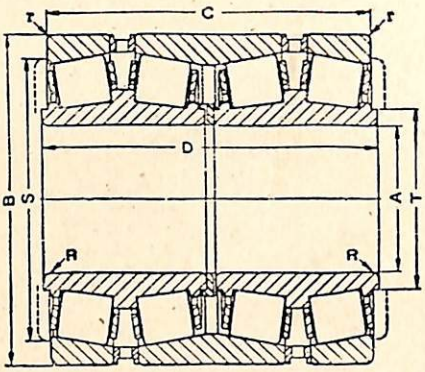
TWO ROW BEARINGS—TYPE NAS

Non-Adjustable — Double Cup, Single Cones — Steep Angle



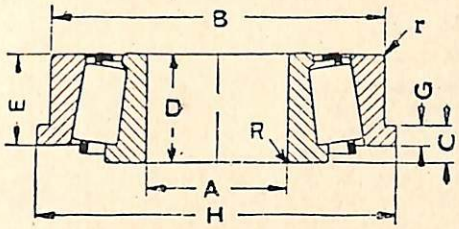
Bore A	B	C	E	F	R	r	Cone	Cup
·7500	2·2500	1·9375	1·4375	·2500	1/16	1/32	NA21075	21226D
1·5625	3·4843	2·1875	1·5625	·3125	3/32	1/32	NA44156	44348D
1·6250	3·6250	2·1875	1·5625	·3125	1/32	1/16	NA44163	44363D
1·7500	3·8750	2·5625	1·7500	·4062	3/32	1/16	NA53176	53390D
2·0000	4·4375	2·5625	1·8125	·3750	3/32	1/16	NA55200	55444D
2·1250	4·8750	3·0625	2·1875	·4375	3/32	1/16	NA72212	72488D
3·5000	7·8750	4·5625	3·1581	·7022	9/64	3/32	NA98350	98789D
4·5000	9·0000	4·5625	3·3125	·6250	9/64	3/32	NA97450	97901D

FOUR ROW BEARINGS—TYPE QO



Bore A	Outside Diameter B	Width		Radius		Shoulder Dia.		Symbol Numbers		
		Over Cups C	Over Cones D	Cone R	Cup r	Cone T	Cup S	Cone	Cup Single	Cup Double
6·0000	9·6250	7·3750	7·5625	1/16	1/8	6 1/2	8 7/8	81601D	81962	81963D
7·0000	11·0000	9·2500	9·2500	1/16	1/8	7 5/8	10 1/4	82680D	82620	82620D
7·0000	12·0000	9·1875	9·3790	1/8	1/8	7 7/8	11	280700D	281200	281201D
7·8740	14·9606	10·7500	10·7500	1/4	1/4	9 1/4	12 7/8	HM144145	HM144112	HM144112D
8·0000	12·5000	11·2500	11·2500	1/4	1/8	8 7/8	11 1/4	93801D	93125	93127D
9·6250	15·0000	12·0000	12·0000	1/8	3/16	10 3/8	13 1/2	126096D	126150	126151XD
10·2500	15·7500	10·0000	10·0625	1/16	1/4	11 1/4	14 1/4	221028D	221575	221576D
10·8750	15·5000	10·6250	10·6250	1/16	1/4	11 9/16	14 3/8	275109D	275155	275156XD
13·0000	19·0000	12·2500	12·0625	1/16	1/8	13 7/8	17 3/4	526131D	526190	526191X
13·9375	19·0000	8·7500	8·3750	1/16	1/4	14 3/4	17 1/2	133136	133180	133181
14·0000	19·0000	10·6250	10·4370	1/16	1/8	14 7/8	17 3/4	204140D	204190	204191D
16·0000	23·2500	15·7500	15·7500	1/8	1/4	17 1/4	21 1/2	833161X	833232	833233D
17·9950	28·7460	16·5000	16·2500	1/16	1/4	20 1/8	26	671798D	672873	672875XD
20·9843	31·8898	17·7165	17·7500	1/4	3/8	23 1/4	28 1/2	626209X	626319X	626318X
25·5000	40·5000	22·2500	22·0000	1/4	1/4	28 1/4	37	424257X	424405	424406D
26·0000	42·0000	25·5000	25·1250	1/4	1/4	29 3/8	39 1/2	428262D	428420	428421
30·0000	48·0000	32·0000	31·6250	1/4	1/2	33 1/2	44	528301D	528480	528481
30·0000	51·0000	25·5000	25·5000	1/4	1/4	34 1/2	46 1/2	433301X	433512	433513

BEARINGS WITH FLANGED CUPS—TYPE SF



Series Number	Cup Number	B ins.	B m/m	H ins.	C ins.	E ins.	G ins.	r ins.
355	354B	3·3465	85	3·5340	·3125	·6875	·1875	1/16
365	362B	3·5433	90	3·7310	·3500	·6250	·1875	1/32
385	382B	3·8125		4·0000	·3125	·7020	·1875	1/32
455	453B	4·2500		4·4687	·4375	·8750	·2187	1/32
475	472B	4·7244	120	4·9420	·4375	·9540	·2187	1/32
495	493B	5·3750		5·5937	·5312	·8750	·2187	1/8
525	522B	4·0000		4·2500	·5625	1·0625	·2500	1/8
555	552B	4·8750		5·1250	·5625	1·1875	·2500	1/8
565	563B	5·0000	127	5·2500	·5625	1·1250	·2500	1/8
575	572B	5·5118	140	5·7615	·5625	1·1250	·2500	1/8
595	592B	6·0000		6·2500	·6250	1·1875	·2500	1/8
655	652B	6·0000		6·2812	·6562	1·2500	·2812	1/8
675	672B	6·6250		6·9070	·7187	1·1875	·2812	1/8
755	752B	6·3750		6·6875	·6875	1·5000	·3125	1/8
775	772B	7·1250		7·4440	·6875	1·5000	·3125	1/8
2500	2523B	2·7500		2·9060	·3437	·7500	·1562	1/16
2600	2631B	2·6150		2·7710	·3437	·7500	·1562	1/32
2700	2720B	3·0000		3·2500	·4375	·7500	·2500	1/8
3100	3120B	2·8593		3·0470	·4375	·9375	·1875	1/8
3500	3525B	3·4375		3·6250	·4375	·9375	·1875	1/8
3700	3720B	3·6718		3·8593	·4375	·9375	·1875	1/8
3900	3920B	4·4375		4·6250	·4375	·9375	·1875	1/8
26000	26283B	2·8346	72	2·9900	·2790	·6250	·1562	1/16
28000	28315B	3·1496	80	3·3050	·3583	·6250	·1562	1/16
52000	52637B	6·3750		6·6240	·6562	1·0312	·2500	1/8
74000	74850B	8·5000		8·8125	·8125	1·3750	·3125	1/8
82000	82950B	9·5000		9·8750	·8750	1·7500	·3750	1/8
94000	94113B	11·3750		11·8125	1·0625	1·8750	·4375	1/8
99000	99100B	10·0000	254	10·4375	1·1875	1·8750	·4375	1/8

FLAT THRUST BEARINGS—T TYPE

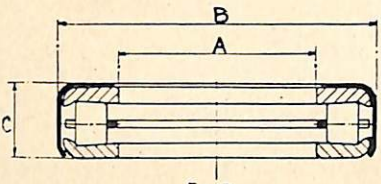


FIG. 131

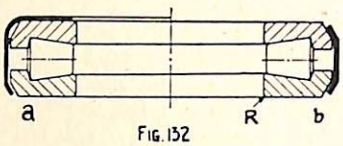


FIG. 132

	A	B	C	R	Fig.	Weight lb.	Price £ s. d.
T63	·6350	1·630	·5000	$^1/_{32}$	131	·161	0 4 0
T76	·7600	1·630	·5180	$^1/_{32}$	131	·167	0 4 0
***BT83**	·8220	1·660	·5310	$^1/_{32}$	131	·191	0 5 0
T88	·8850	1·8906	·5940	$^1/_{32}$	131	·241	0 5 6
†BT94	·9470	1·8906	·5940	$^1/_{32}$	131	·234	0 4 0
BT101	1·0100	2·0000	·6250	$^1/_{32}$	131	·281	0 5 6
BT107	1·0720	2·0000	·6250	$^1/_{32}$	131	·272	0 5 6
BT113X	1·1350	2·1875	·6250	$^1/_{32}$	131	·320	0 4 9
BT114X	1·1310 & 1·1460	2·0000	·6250	$^1/_{32}$	131	·260	0 6 9
BT119	1·1975	2·1875	6250	$^1/_{32}$	131	·366	0 4 9
BT126	1·2600	2·1875	·6250	$^1/_{32}$	131	·304	0 4 9
T138X	1·3850	2·6250	·7656	$^1/_{16}$Ch.	132a	·631	0 18 8
T144X	1·4470	2·6250	·6875	$^1/_{8}$	132b	·548	1 1 0
T151	1·5100	2·8594	·8440	$^1/_{8}$Chf.	132a	·818	0 17 0
T163X	1·6350	2·8594	·8440	·08Ch.	132a	·790	1 5 6
T176	1·7600	3·2656	·9375	$^1/_{32}$Ch.	132a	1·179	1 6 8
‡T188S	1·8850	3·2970	·9500	$^1/_{32}$Ch.		1·168	1 17 0
T201	2·0100	3·6718	1·0312	$^1/_{8}$	132	1·688	2 4 0
T208	2·0720	3·6718	1·0625	$^1/_{32}$Ch.	132a	1·729	2 4 0
T251	2·5100	4·3750	1·0625	$^1/_{32}$Ch.	132a	2·343	3 11 0
T301	3·0100	5·2500	1·3125	$^3/_{32}$	132b	4·122	3 13 0
T488S	4·8750	8·5000	1·7500	$^3/_{64}$	133	13·25	‖

* T83 is replaced by BT83.
† T94 and T94X are replaced by BT94.
‡ T188S has special double container.
‖ For price apply to British Timken Ltd.

FLAT THRUST BEARINGS—T TYPE *(Continued)*

Heavy Duty

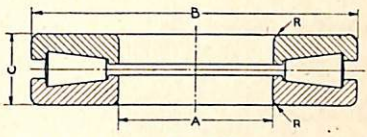


Fig. 133

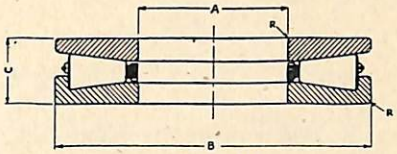


Fig. 134

	A	B	C	R	Fig.	Weight lb.	Price £ s. d
TW3000	3·0000	6·3750	1·3125	1/8	134	11·0	
TW4000	4·0000	8·5000	1·8125	1/8	134	19·5	
TW5000	5·0000	10·5000	2·3125	3/16	134	36·5	
TW6000	6·0000	12·5000	2·7500	1/4	134	64·0	
TW7000	7·0000	14·5000	3·2500	5/16	134	107·0	For price apply British Timken Ltd.
TW8000	8·0000	16·5000	3·6250	3/8	134	153·0	
TW9000	9·0000	19·0000	4·1250	7/16	134	230·0	
TW1217	12·0000	17·5200	3·6250	3/16	133	108·0	
T1421	14·0000	21·0000	4·0000	1/4	133	185·2	
TW14256	14·0000	25·0000	6·6250	1/4 Ch.	133	540·0	
T23305	23·0000	30·5000	4·7500	1/4	133	355·0	

STEERING GEAR TYPE BEARINGS

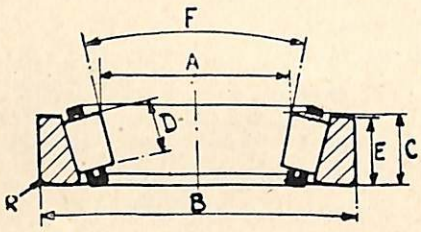


Fig. 1.

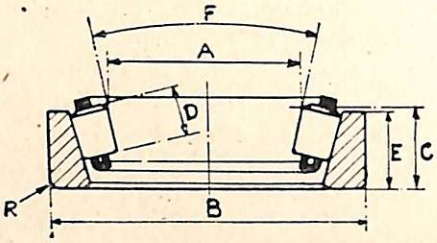


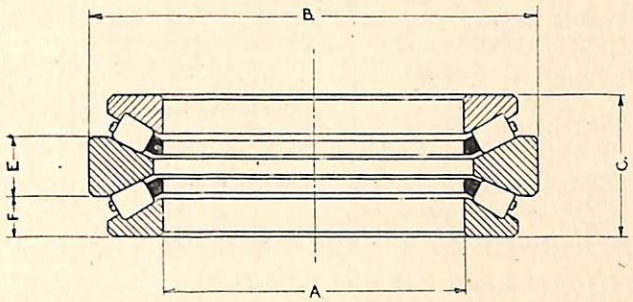
Fig. 2.

Cup, Roller and Cage Dimensions.

No.	A	B	C	D	E	F	R	Fig.	Weight lb.	Price £ s. d.
*5BA–6	1·1051	1·7500	·375	·304	·3750	25°–24	1/16	1	·133	0 6 6
†5BC–7A	1·1147	1·9352	·896	·305	·8750	25°–24	1/64	2	·392	0 7 10
‡11BA–13	1·2996	1·9380	·485	·304	·4375	29°–58	1/16	1	·183	0 6 10
11BA–13C	1·2996	1·9380	·485	·304	·4531	29°–58	1/16	1	·185	0 7 2
11BC–14	1·3109	2·1227	·703	·305	·6370	29°–58	1/64 Ch.	2	·351	0 7 10
11BC–14C	1·3109	2·2477	·727	·305	·6730	29°–56	Bevel	2	·433	0 8 4
15A–16	1·4207	2·0470	·516	·304	·4688	32°–50	1/16	1	·211	0 10 3
‖ 21BA–23	1·3605	2·1860	·500	·407	·4375	29°–20	1/16	1	·279	0 9 10
31A–32	1·5824	2·4050	·500	·411	·4375	29°–36	1/16	1	·304	0 10 1
31A–32C	1·5824	2·4050	·500	·411	·4688	29°–36	1/16	1	·321	0 10 1
31C–32C	1·5992	2·4050	·532	·413	·4688	29°–36	1/16	2	·321	0 10 1
35C–36	1·7187	2·5310	·594	·413	·5625	31°–52	1/16	2	·419	0 12 9

* 5BA replaces 5A
† 7A Stepped Cup
‡ 11BA replaces 11A
‖ 21BA replaces 21A

AIRSCREW BEARINGS



Bearing Number	A	B	C	E	F	Weight lb.	Price £ s. d.
TW325S	3·250	5·125	1·750	·8125	·469	4·18	
TW387	3·875	5·750	1·812	·750	·531		
***TW400/G**	4·000	5·1245	1·437	·551	·443	2·25	
***TW400X/G**	4·000	5·1215	1·437	·551	·443	2·23	
†TW402X	Dimensions on application						
†TW459-1	Dimensions on application						
TW460M	4·600	6·4003	1·890	·750	·570	5·5	
TW460XS	4·600	6·3965	2·000	·750	·680	5·93	
‡TW460S/G	4·600	6·4003	2·000	·750	·680	5·98	
TW494S	4·949	6·7703	2·200	·880	·710	6·93	
‡TW494S/G	4·949	6·7703	2·200	·880	·710	6·93	For prices apply to British Timken Ltd.
‡TW494XS-1/G	4·9523	6·9194	2·200	·880	·710	7·25	
†TW494M-1	Dimensions on application						
†TW531X	Dimensions on application						
†TW580	Dimensions on application						
TW587	5·8797	7·7184	2·500	1·0625	·7188	10·06	
‡TW587/G	5·8797	7·7184	2·500	1·0625	·7188	10·06	
TW607	6·0797	8·0004	2·500	1·0625	·7188	10·56	
†TW637	Dimensions on application						
TW667	6·6672	8·5059	2·500	1·0625	·7188	11·06	
TW667X	6·6672	8·6984	2·500	1·0625	·7188	11·81	
‡TW667X/G	6·6672	8·6984	2·500	1·0625	·7188	11·81	
†TW1025	Dimensions on application						

The dimensions specified for copper plated bearings are the sizes prior to plating. Thickness of plating is from ·0001 inch to ·0003 inch.

* Copper plated all over
† Special type
‡ Copper plated on bores and O/D

DECIMAL CONVERSION FOR TOLERANCES

M/m to Inches

M/m	Inches
1·00	·0390
0·10	·0040
0·01	·0004

Inches to M/m

Inches	M/m
1·000	25·4000
·100	2·5400
·010	·2540
·001	·0254

M/m	Inches
·005	·0002
·010	·0004
·015	·0006
·020	·0008
·025	·0010
·030	·0012
·035	·0014
·040	·0016
·045	·0018
·050	·0020
·055	·0022
·060	·0024
·065	·0026
·070	·0028
·075	·0029
·080	·0031
·085	·0033
·090	·0035
·095	·0037
·100	·0039

Inches	M/m
·0005	·013
·0010	·025
·0015	·038
·0020	·051
·0025	·064
·0030	·076
·0035	·089
·0040	·102
·0045	·114
·0050	·127
·0055	·140
·0060	·152
·0065	·165
·0070	·178
·0075	·190
·0080	·203
·0085	·216
·0090	·229
·0095	·242
·0100	·254

CONVERSION TABLES

Millimetres to Decimal Inches—Units

m/m		10	20	30	40	50	60	70	80	90
0		·39370	·78740	1·18110	1·57480	1·96851	2·36221	2·75591	3·14961	3·54331
1	·03937	·43307	·82677	1·22047	1·61417	2·00788	2·40158	2·79528	3·18898	3·58268
2	·07874	·47244	·86614	1·25984	1·65354	2·04725	2·44095	2·83465	3·22835	3·62205
3	·11811	·51181	·90551	1·29921	1·69291	2·08662	2·48032	2·87402	3·26772	3·66142
4	·15748	·55118	·94488	1·33858	1·73228	2·12599	2·51969	2·91339	3·30709	3·70079
5	·19685	·59055	·98425	1·37795	1·77165	2·16536	2·55906	2·95276	3·34646	3·74016
6	·23622	·62992	1·02362	1·41732	1·81103	2·20473	2·59843	2·99213	3·38583	3·77953
7	·27559	·66929	1·06299	1·45669	1·85040	2·24410	2·63780	3·03150	3·42520	3·81890
8	·31496	·70866	1·10236	1·49606	1·88977	2·28347	2·67717	3·07087	3·46457	3·85827
9	·35433	·74803	1·14173	1·53543	1·92914	2·32284	2·71654	3·11024	3·50394	3·89764

Millimetres to Decimal Inches—Units

m/m	100	110	120	130	140	150	160	170	180	190
0	3·93701	4·33071	4·72441	5·11811	5·51181	5·90552	6·29922	6·69292	7·08663	7·48033
1	3·97638	4·37008	4·76378	5·15748	5·55118	5·94489	6·33859	6·73229	7·12600	7·51970
2	4·01575	4·40945	4·80315	5·19685	5·59055	5·98426	6·37796	6·77166	7·16537	7·55907
3	4·05512	4·44882	4·84252	5·23622	5·62992	6·02363	6·41733	6·81103	7·20474	7·59844
4	4·09449	4·48819	4·88189	5·27559	5·66929	6·06300	6·45670	6·85040	7·24411	7·63781
5	4·13386	4·52756	4·92126	5·31496	5·70866	6·10237	6·49607	6·88977	7·28348	7·67718
6	4·17323	4·56693	4·96063	5·35433	5·74803	6·14174	6·53544	6·92914	7·32285	7·71655
7	4·21260	4·60630	5·00000	5·39370	5·78740	6·18111	6·57481	6·96851	7·36222	7·75592
8	4·25197	4·64567	5·03937	5·43307	5·82677	6·22048	6·61418	7·00788	7·40159	7·79529
9	4·29134	4·68504	5·07874	5·47244	5·86614	6·25985	6·65355	7·04725	7·44096	7·83466

CONVERSION TABLE

LENGTHS

To convert :—	Multiply by
Millimetres to mils	39·37
Millimetres to inches	0·03937
Centimetres to inches	0·3937
Centimetres to feet	0·032808
Inches to mils	1000
Inches to millimetres	25·4
Inches to centimetres	2·54
Feet to centimetres	30·48
Feet to metres	0·3048
Yards to metres	0·9144
Yards to kilometres	0·0009144
Metres to inches	39·370
Metres to feet	3·2808
Metres to yards	1·0936
Kilometres to feet	3280·8
Kilometres to yards	1093·6
Kilometres to miles	0·62137

AREAS

To convert :—	Multiply by
Circular mils to square millimetres	0·0005067
Circular mils to square inches	0·00000078539
Square millimetres to circular mils	1974
Square millimetres to square inches	0·00155
Square centimetres to square inches	0·155
Square inches to circular mils	1273240
Square inches to square millimetres	645·16
Square inches to square centimetres	6·4516

WEIGHTS

To convert :—	Multiply by
Pounds (av.) to kilogrammes	0·4535924
Kilogrammes to pounds (av.)	2·2046223
Kilogrammes to cwts.	0·019684
Kilogrammes to tons	0·0009842
Kilogrammes to tonneaux	0·001
Cwts. to kilogrammes	50·80235
Tons to kilogrammes	1016·047
Tons to tonneaux	1·016047
Tonneaux to kilogrammes	1000
Tonneaux to tons	0·9842

CONVERSION TABLE

Fractional Inches to Millimetres

Inches		1	2	3	4	5	6	7	8	9	10	11	12
		25·4000	50·8000	76·2000	101·600	127·000	152·400	177·800	203·200	228·600	254·000	279·400	304·800
1/32	·7937	26·1937	51·5937	76·9937	102·394	127·794	153·194	178·594	203·994	229·394	254·794	280·194	305·594
1/16	1·5875	26·9875	52·3875	77·7875	103·188	128·588	153·988	179·388	204·788	230·188	255·588	280·988	306·388
3/32	2·3812	27·7812	53·1812	78·5812	103·981	129·381	154·781	180·181	205·581	230·981	256·381	281·781	307·181
1/8	3·1750	28·5750	53·9750	79·3750	104·775	130·175	155·575	180·975	206·375	231·775	257·175	282·575	307·975
5/32	3·9687	29·3687	54·7687	80·1687	105·569	130·969	156·369	181·769	207·169	232·569	257·969	283·369	308·769
3/16	4·7625	30·1625	55·5625	80·9625	106·363	131·763	157·163	182·563	207·963	233·363	258·763	284·163	309·563
7/32	5·5562	30·9562	56·3562	81·7562	107·156	132·556	157·956	183·356	208·756	234·156	259·556	284·956	310·356
1/4	6·3500	31·7500	57·1500	82·5500	107·950	133·350	158·750	184·150	209·550	234·950	260·350	285·750	311·150
9/32	7·1437	32·5437	57·9437	83·3437	108·744	134·144	159·544	184·944	210·344	235·744	261·144	286·544	311·944
5/16	7·9375	33·3375	58·7375	84·1375	109·538	134·938	160·338	185·738	211·138	236·538	261·938	287·338	312·738
11/32	8·7312	34·1312	59·5312	84·9312	110·331	135·731	161·131	186·531	211·931	237·331	262·731	288·131	313·531
3/8	9·5250	34·9250	60·3250	85·7250	111·125	136·525	161·925	187·325	212·725	238·125	263·525	288·925	314·325
13/32	10·3187	35·7187	61·1187	86·5187	111·919	137·319	162·719	188·119	213·519	238·919	264·319	289·719	315·119
7/16	11·1125	36·5125	61·9125	87·3125	112·713	138·113	163·513	188·913	214·313	239·713	265·113	290·513	315·913
15/32	11·9062	37·3062	62·7062	88·1062	113·506	138·906	164·306	189·706	215·106	240·506	265·906	291·306	316·706
1/2	12·7000	38·1000	63·5000	88·9000	114·300	139·700	165·100	190·500	215·900	241·300	266·700	292·100	317·500
17/32	13·4937	38·8937	64·2937	89·6937	115·094	140·494	165·894	191·294	216·694	242·094	267·494	292·894	318·294
9/16	14·2875	39·6875	65·0875	90·4875	115·888	141·288	166·688	192·088	217·488	242·888	268·288	293·688	319·088
19/32	15·0812	40·4812	65·8812	91·2812	116·681	142·081	167·481	192·881	218·281	243·681	269·081	294·481	319·881
5/8	15·8750	41·2750	66·6750	92·0750	117·475	142·875	168·275	193·675	219·075	244·475	269·875	295·275	320·675
21/32	16·6687	42·0687	67·4687	92·8687	118·269	143·669	169·069	194·469	219·869	245·269	270·669	296·069	321·469
11/16	17·4625	42·8625	68·2625	93·6625	119·063	144·463	169·863	195·263	220·263	246·063	271·463	296·863	322·263
23/32	18·2562	43·6562	69·0562	94·4562	119·856	145·256	170·656	196·056	221·456	246·856	272·256	297·656	323·056
3/4	19·0500	44·4500	69·8500	95·2500	120·650	146·050	171·450	196·850	222·250	247·650	273·050	298·450	323·850
25/32	19·8437	45·2437	70·6437	96·0437	121·444	146·844	172·244	197·644	223·044	248·444	273·844	299·244	324·644
13/16	20·6375	46·0375	71·4375	96·8375	122·238	147·638	173·038	198·438	223·838	249·238	274·638	300·038	325·438
27/32	21·4312	46·8312	72·2312	97·6312	123·031	148·431	173·831	199·231	224·631	250·031	275·431	300·831	326·231
7/8	22·2250	47·6250	73·0250	98·4250	123·825	149·225	174·625	200·025	225·425	250·825	276·225	301·625	327·025
29/32	23·0187	48·4187	73·8187	99·2187	124·619	150·019	175·419	200·819	226·219	251·619	277·019	302·419	327·819
15/16	23·8125	49·2125	74·6125	100·013	125·413	150·813	176·213	201·613	227·013	252·413	277·813	303·213	328·613
31/32	24·6062	50·0062	75·4062	100·806	126·206	151·606	177·006	202·406	227·806	253·206	278·606	304·006	329·406

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